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PESTICIDES ABSTRACTS (formerly Health Aspects of Pesticides Abstract Bulletin) is a monthly publication of the Technical Services Division of the Office of Pesticide Programs, Environmental Protection Agency.

The purpose of this publication is to foster current awareness of the major worldwide literature pertaining to the effects of pesticides as defined in the Table of Contents. The publication represents a monthly review of more than 2,000 primary and secondary sources. A list of periodicals from which articles have been abstracted appears annually in the January issue. Subjects and authors of abstracted articles are cross-referenced in quarterly and annual indexes. Reprint requests should be directed to the author of the complete article.

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75-2062. Deichman, W. B. (Res. Teaching Cent. Toxicol, Univ. Miami Sch. Med., Coral Gables, FL). **Cummings Memorial Lecture—1975. The market basket: food for thought.** *Am. Ind. Hyg. Assoc. J.* 36(6): 411-429; 1975. (56 references)

The bans on the use of DDT, aldrin, and dieldrin by the Environmental Protection Agency are discussed and arguments for their use are presented. In 1972 DDT was declared a potential human carcinogen, and in 1974, the use of aldrin and dieldrin was declared an imminent hazard because it presented an unreasonable risk of cancer. The arguments were based on studies with mice. In some strains of mice, they do induce an increase in certain tumors, primarily in the liver. At the hearings too little consideration was given to the fact that the effects in mice are not predictive of other mammalian species including other rodents and man. A study on long term (16-25 yr) occupational exposure to 3.6 to 18 mg of DDT in men found no evidence of hepatic disease or liver function abnormalities. A clear no effect level was established in men exposed for varying periods since 1954 at an intake of 17.5 mg of aldrin or dieldrin per kg body wt/day, equal to more than 250 times the 1970 average U.S. daily intake. Men in the high exposure group had a total intake up to 600 times the average U.S. intake. Extensive tests before and after 10 yr of exposure did not show any demonstrable signs of liver injury.

75-2063. Westermark, T.; Odsjo, T.; Johnels, G. G. (Div. Nucl. Chem., Royal Inst. Technol., Stockholm, Sweden). **Mercury content of bird feathers before and after Swedish ban on alkyl mercury in agriculture.** *Ambio* 4(2): 87-92; 1975. (41 references)

Alkyl mercury for seed dressing was banned in Sweden in 1966. Mercury levels in feathers of birds exposed to Hg compounds whether by feeding directly on seed or by preying on seed eaters were investigated. The feathers were generally sampled from 10 species of terrestrial birds in the area of Kvismaren. The levels of Hg present in feathers reflect the amount present in the blood stream when the individual feathers were formed and may result in different levels due to moulting, particularly in migratory species. There are strong indications that the ban decreased levels of Hg in a number of bird species. The behavior of alkyl Hg compounds in organisms, especially degradation, excretion, and penetration, explain the high degree of accumulation of these substances. The accumulation power of alkyl Hg compounds was estimated through a simple model. Analyses of feather material show that most of the Hg is in the form of methyl mercury.

75-2064. Kearney, P. C.; Woolson, E. A.; Isensee, A. R.; Helling, C. S. (Pestic. Degradation Lab., Agric. Environ. Qual. Inst., Beltsville, MD 20705. **Tetrachloro dibenzo dioxin in the environment: sources, fate, and decontamination.** *Environ. Health Perspect.* 5: 273-277; 1973. (10 references)

The sources, fate, and decontamination of 2,3,7,8-tetrachlorodibenzo-*p*-dioxin (TCDD) in the environment are reviewed. The major source of TCDD input into the environment in the past was from the use of the herbicide 2,4,5-T. Future inputs will be minimal if the dioxin content in this compound is will be minimal held at low levels (0.1 pmm) during the manufacturing process. In the environment, TCDD behaves similarly to some of the shorter-lived chlorinated hydrocarbon insecticides. It is fairly persistent in soils, is not taken up into the economically valuable portions of plants, and is slowly decomposed in water in the presence of sunlight. Analyses of 19 eagle carcasses revealed no detectable dioxins, but more sensitive analytical techniques are needed to give a clear picture of the TCDD levels in wildlife. Among the methods of disposal which are available for the safe decontamination of surplus stocks of 2,4,5-T containing TCDD are incineration, soil disposal, and chlorinolysis.

75-2065. Huff, J. E.; Wassom, J. S. (Biomed. Stud. Toxicol. Inform. Response Cent., Oak Ridge Natl. Lab., Oak Ridge, TN 37830). **Chlorinated dibenzodioxins and dibenzofurans.** *Environ. Health Perspect.* 5: 283-312; 1973. (242 references)

An annotated bibliography of 242 references on chlorinated dibenzodioxins and dibenzofurans is presented. The references, categorized by year, are arranged alphabetically by author. The number of references per year are 56/1973; 67/1972; 66/1971; 24/1970; 20/1969-1934. The sources searched include: multidisciplinary information resources, specialized information centers and libraries, on-line computer data bases, and individual journals.

75-2066. Fye, R. E. (Agric. Res. Serv., Cotton Insects Biol. Contr. Lab., Tucson, AZ). **Ecosystem analysis for the introduction of integrated pest control.** *Hortscience* 9(2): 129-131; 1974. (37 references)

To effectively use biological control techniques, it is essential to determine when the introduction of the parasite or predator should be made and the population level of the target insect so that the proper number of organisms may be introduced. No reliable system exists yet for predicting the spring emergence of target insect populations. Thus, one must rely on population assessments to establish age stratification on some initial spring data. Once the intial age stratification is established, temperature input is used to evaluate the continuing age stratification in the target population. When the developmental studies were made in the lab and projected into the field, some difficulty was encountered in adjusting the developmental rate due to the differences in nutrition of the cotton plant in the field and the laboratory medium and in the genetic structure of the field populations compared with the laboratory populations. In addition to the target insects, the developmental rates and fecundity of various parasites and predators have been established. As this data is refined, it will be possible

to determine whether peak populations of target insects and the naturally occurring predators or parasites will coincide. Generally, as the seasonal production of a crop proceeds, there is a modification of the temperatures within the crop canopy that must be considered if developmental progress is to be assessed adequately. Regression equations are used which provide a partially corrected overall estimate of temperature in the plant parts occcupied by insects. Crude capabilities are now available to determine when a specific insect stage is going to occur in an insect population, and preliminary information is available on several key climatic mortality factors. The major basic weaknesses are the inability to make population assessments with acceptable confidence limits and to determine the mortality effected by naturally occurring biological control organisms. To effectively use biological control introductions, one must first establish whether a parasite or predator is ecologically adapted to the area in which it is to be used. It must also be determined whether the parasite or predator population dynamics based on development, fecundity, longevity, and behavior will have adequate impact on the target insect population.

75-2067. Papworth, D. S.; Milward, A. F.; Taylor, J. K.; Mayhew, A. W. (Pest Survey Group, Pest Invest. Contr. Lab., Min. Agric. Fish. Food, Slough, Berkshire, England). **Second survey of pesticides used for protection of stored grain and the control of harmful mammals on British farms.** *Int. Pest. Contr.* 17(2): 12-16; 1975.

The types and quantities of pesticides used in England and Scotland during the 1971-1972 season were surveyed and compared to a survey made for 1966-1967. Data were obtained from a sample of farms in 11 counties representative of cereal growing in England and a separate sample of farms representative of cereal growing in Scotland. The total quantity of each pesticide is tabulated for dieldrin, γ-BHC, fenitrothion, malathion, pyrethrins, carbon tetrachloride, and ethylene dichloride. In the 1966-1967 survey there were 15 DDT users. The most often used insecticide for both surveys was malathion, followed by γ-BHC. Except for the introduction of fenitrothion between 1967-1972, use of pesticides on stored grain changed little in this period. The use of malathion increased slightly, and the use of DDT stopped. The sample was not large enough to include comments on minor insecticides like dieldrin, but a decrease in the use of pyrethrins may be inferred.

75-2068. Soler, J. P. (Author address not given). **La alimentacion humana y los plaguicidas. [The human diet and pesticides.]** *ION (Madrid)* 35(404): 183-184; 1975. (Spanish)

Not all pesticides used in agriculture have the same degree of harmful influences on the environment or individual. Pesticides must be judged according to both their dangers and also their effectiveness against insects. By the year 2000, agricultural production must have increased to keep pace with the expected world population at that time. Food consumption by more than half of the global population must also be raised to at least a healthy minimum daily intake level. Presently, 35% of world agricultural production is lost due to pests. Pesticide use, therefore, must also be judged in this light.

75-2069. Hugunin, A. G.; Bradley, R. L., Jr. (Dep. Food Sci., Univ. Wisconsin, Madison, WI 53706). **Exposure of man to mercury. A review. II. Contamination of food and analytical methods.** *J. Milk Food Technol.* 38(6): 354-368; 1975. (245 references)

Man is exposed to Hg through air, water, and food. Although most foods contain less than 0.02 ppm Hg, considerable variation occurs depending on the type of food, production techniques, and location. Mercury is concentrated at higher trophic levels of food chains, particularly in aquatic ones in which concentration factors of hundreds and thousands have been observed. The Hg concentration in some large fish exceeds the 0.5 ppm tolerance limit of the FDA and the 1.0 ppm limit of the Swedish government. Fifty-seven grams of fish containing 0.5 ppm Hg in the methyl form could be consumed daily without exceeding the joint FAO/WHO recommended weekly tolerable intake of 0.2 mg. In the United States, Sweden, and Japan the per capita daily fish consumptions are 18, 56, and 88 g respectively. Mercury concentrations are determined through colorimetric, atomic absorption, or emission spectrometry, neutron activation, or gas chromatography techniques. Differentiation of Hg compounds usually necessitates selective extraction followed by gas chromatographic analysis.

75-2070. Romeo, I.(Author address not given).**Consultoria profesional. [Questions and answers (DDT and toxaphene).]** *Medicamenta* 64(521): 69-71; 1974. (Spanish)

DDT and other pesticides have been used against various agricultural pests. The use of DDT in agriculture has resulted in contamination of rivers, lakes, and coastal waters and decreased the quality of fish products, bird life, bees, livestock, and crops. For these reasons the government has prohibited the use of DDT on farm products. An alternative pesticide, toxaphene, is highly toxic. Restrictions on toxaphene are even greater than those on DDT; toxaphene can be used only against cotton and potato diseases. When toxaphene preparations are in powdered form, and the active ingredient is at a maximum concentration of 5%, the pesticide has a toxicity similar to that of DDT.

75-2071. Bertrand, G. L. (Dep. Chem., Missouri Univ., Rolla, MO). **Accumulation of mercury by fish and turtles of the Little Piney River.** *Natl. Tech. Inform. Serv. PB* 239, 1974, 7 p.

Trout that had been continuously frozen since they were taken from Missouri streams in the 1946-50 period

were analyzed for mercury. These analyses (flameless atomic absorption) were compared with those of the same species collected recently from the same streams. The older fish had a much higher mercury content (about 3 ppm mercury). Mercury content of trout and turtles caught in 1974 ranged from 0.2 to 0.4 ppm. Two explanations are suggested for the higher mercury content of the older fish: (a) fungicides containing mercury, formerly added as seed treatments, are no longer used; and (b) most of the older fish were raised under natural conditions, while most current catches are now raised in hatcheries and regularly released in the streams. (Author abstract by permission)

75-2072. Karminski, W.; Olszanowski, A. (Inst. Organic Chem and Technol., Silesian Polytech. Inst., Gliwice, Poland). **Rola i znaczenie DDT. [The significance and consequences of DDT.]** *Przem. Chem.* 54(1): 13-15; 1975. (7 references) (Polish)

Aspects of DDT including discovery, significance in preventing epidemics during and after World War II, importance as a factor in increasing yield of crops and effect on world food supply, theories of mechanism of action, persistence in the environment, and ecological impact are briefly reviewed. The chemical structure and physical characteristics of DDT and its analogs, their chemical and biological degradation, LD50 differences, and synergistic action with other (inherently nontoxic) substances are discussed at some length.

75-2073. Spynu, Ye. I.; Ivanova, L. M. (Author address not given). **Modelyuvannya—prohnozuvannya—upravlinnya v systemi zakhodiv profilaktiki zabrudennya navkolyshn'oho seredovyshcha. [Modeling—predicting—controlling in a system of measures to prevent environmental pollution.]** *Visn. Akad. Nauk Ukr. RSR* 2: 78-88; 1974. (45 references) (Ukrainian)

The review discusses the harmful effects of pesticides (organochlorine and organomercury pesticides, arsenic containing compounds, DDT, etc.), on humans including genetic disorders. Mathematical models used to determine the optimal use of pesticides without harmful effects on the environment are described. The interaction of pesticide and plant is the example used in the mathematical modeling. The group calculation of arguments was based on the physicochemical properties of the pesticide, the biochemical aspects of the plant, the method of applying the pesticide, and meteorological factors. Standards for new pesticides, studies on the behavior of pesticides in the environment, and observance of permissible levels are among the preventive measures discussed.

75-2074. Anonymous. (Dep. Hyg. Aichi Prefect. Office, Nagoya, Japan). [**Organochlorine pesticide residues in cow milk, 1973.**] *Aichi-Ken Eisei Nenpo, Showa 48-Nendo (Annu. Rep. Hyg., Aichi Prefecture 1973)* 352; 1975. (Japanese)

Organochlorine pesticide residues such as β-BHC, total DDT, and dieldrin were inspected in 71 specimens collected from Aichi Prefecture. No specimen contained more pesticide residue than the tolerance standard, 0.2, 0.05, and 0.005 ppm respectively in the above order. The maximum, minimum, and average contents were 0.026, 0.001, and 0.006 ppm of β-BHC; 0.002, not detected, and 0.000 of total-DDT; and 0.005, trace, and 0.000 of dieldrin.

75-2075. Sato, K.; Suwanai, M. (Fac. Agric., Tokyo Univ. Agric. Technol., Tokyo, Japan). **Adsorption of hydrogen phosphide to cereal products.** *Appl. Entomol. Zool.* 9(3): 127-132; 1974. (3 references)

Several cereal products were exposed to gaseous hydrogen phosphide in sealed glass flasks under different conditions of exposure period, temperature, concentration of fumigant, and particle size of the cereal product. The amount of hydrogen phosphide adsorbed to these samples was measured colorimetrically. The quantitative adsorption of a 0.37% aerosol concentration of hydrogen phosphide onto millet, wheat, hulled rice, azuki bean, and soy bean was followed over a 12 day period at 25°C, and was observed to increase slowly in all cases until the 6th day when adsorptive equilibrium was reached, and continued to increase through the 12th day. The only exception to this tendency was seen in millet which showed very rapid adsorption and adsorptive equilibrium of the fumigant. A direct correlation was noted between seed smallness and adsorption. The adsorption of hydrogen phosphide to millet and hulled rice exposed to a 0.37% air concentration of the fumigant for 2 days increased with a rise in temperature, and millet adsorbed significantly more fumigant than did hulled rice. The amount of hydrogen phosphide adsorbed to wheat and soybean exposed to concentrations between 0 and 1.48% for 2 days showed that adsorption onto wheat increased from 0 to 1.04 μg/g in direct proportion to the concentration of fumigant, and exhibited first-order reaction kinetics. However, soy bean showed less adsorption than wheat, and displayed a maximum concentration of 0.22 μg/g. Hydrogen phosphide adsorbed to hulled rice particles of various sizes exposed to a concentration of 0.37% for 2 days at 25°C increased as a function of decrease in particle size. The results of this study support the concept that adsorption is governed by exposure temperature and concentration of fumigant. Reduction of particle size favors increased adsorption of hydrogen phosphide to hulled rice particles and increase in adsorption of the fumigant is due to the relative increase in surface area as a consequence of a decrease in particle size.

75-2076. Yule, W. N.; Varty, I. W. (Chem. Control Res. Inst., Dep. Environment, Canadian Forestry Serv., Ottawa, Ontario, Canada). **The persistence and fate of of fenitrothion insecticide in a forest environment. III. Deposit and residue studies with black spruce and red maple.** *Bull. Environ. Contam. Toxicol.* 13(6): 678-680; 1975. (3 references)

The persistence and fate of fenitrothion was studied following operational spraying of a mixed forest for budworm control. The spray dosage was 3 ounces/acre fenitrothion in an aqueous emulsion. Samples of black spruce and red maple foliage were analyzed before and at various intervals after application of the insecticide. The new black spruce foliage showed no evidence of systemic residues from the previous year's spraying, although the older foliage showed traces of fenitrothion. The rate of residue decrease was greater in the new foliage than in the older foliage due to a large biomass dilution factor (seasonal leaf growth) operating together with the real rate loss of fenitrothion. The initial fenitrothion residue levels on the red maple foliage were 3-4 fold greater than those on the black spruce foliage, a difference which may be associated with the different growth habits of the two species. There was no significant transfer of pesticide residues to the soil upon leaf fall.

75-2077. Wolfe, N. L.; Zepp, R. G.; Baughman, G. L.; Gordon, J. A. (Freshwater Ecosystems Br., Southeast Environmental Res. Lab., Athens, GA 30601). **Kinetic investigation of malathion degradation in water.** *Bull. Environ. Contam. Toxicol.* 13(6): 717-713; 1975. (1 reference)

The degradation kinetics of malathion in water were studied under pseudo-first-order reaction conditions. Malathion was stable in water at pH 2.59 for 10 days at 27°C; the extrapolated rate constant was $(4.8 \pm 0.2) \times 10^5/M$/sec at 27°C. The disappearance second-order-rate constant for malathion basic degradation at 27°C was $5.5 \pm 0.3/M$/sec. At pH 8, the malathion half-life was 36 hr. Half-life product studies showed the presence of undegraded malathion, malathion monoacids, *O,O*-dimethylphosphorodithioic acid, and diethyl fumarate; carboxyl ester hydrolysis was favored at lower temperatures. The monoacid mixture at 27°C consisted for 85% α-monoacid and 15% β-monoacid. At pH 8, the monoacids would have a half-life of about 24 days. Half-life product studies of the monoacids demonstrated the presence of malathion monoacids, malathion diacid, ethyl hydrogen maleate, and *O,O*-dimethylphosphorodithioic acid. At pH 8.0, malathion diacid would have a degradation half-life of about 1 yr. Product studies of the diacid at one half-life showed the presence of malathion diacid, thiomalic acid, and *O,O*-dimethyl-phosphorothioic acid. Malathion was stable in oxygen-saturated water at acidic pH's for up to 2 weeks. The malathion photolysis half-life was 990 hr in distilled water (pH 6) with wave lengths greater than 290 nm. However, in a river water sample containing a large amount of colored material, malathion was 50% degraded by sunlight in 16 hr.

75-2078. Kliger, L.; Yaron, B. (Div. Soil Residues Chem., Inst. Soils Water, Volcani Cent., Bet Dagan, Is-

rael). **Parathion recovery from soils after a short contact period.** *Bull. Environ. Contam. Toxicol.* 13(6): 714-719; 1975. (5 references)

Air-dried samples of 14 different sterile and nonsterile soils were shaken with 10 ppm ^{14}C-parathion with or without distilled water. Parathion and its degradation products were extracted from the soils after 24 hr incubation at room temperature and the pesticide residue levels were determined using liquid scintillation spectrometry. Under these conditions, no degradation of the parathion was observed. Recovery of the added parathion ranged between 50% and 90%, the percentage recovery depending largely on the clay and organic matter content in the soil. Recovery was not strongly dependent on the soil mechanical composition and was not at all affected by the soil treatment. Thus, parathion fixation was a function of the soil organic matter and the type of clay, suggesting that a single common extraction procedure may not be used for soils with different compositions.

75-2079. Dejonckheere, W.; Steurbaut, W.; Kips, R. H. (Dep. Crop Protection Chem., Fac. Agr. Sci., State Univ. Gent, Gent, Belgium). **Residues of quintozene, hexachlorobenzene, dichloran and pentachloroaniline in soil and lettuce.** *Bull. Environ. Contam. Toxicol.* 13(6): 720-729; 1975. (11 references)

Electron capture gas chromatography was used to determine the residue levels of quintozene, dichloran, hexachlorobenzene (HCB), pentachloroaniline (PCA), and pentachlorothioanisole (PCTA) in lettuce grown in soil treated with quintozene 18 mo before harvesting and in lettuce grown in soil treated with quintozene and dichloran just before and 2 weeks after planting; the residue levels in the soil were also measured. Eighteen mo following the application of quintozene (20 g/are) to the soil, the soil residue level was 0.12 ppm and the residue level in the lettuce was 0.11-0.37 ppm. Treating the soil with 20 g/are just before or 2 weeks after planting increased the soil residue levels to 0.44 and 0.40 ppm, respectively, and increased the lettuce residue levels to 0.19-0.49 ppm and 0.16-0.57 ppm, respectively. Similar treatment with quintozene at 200 g/are produced average soil residues of 6.1 and 5.6 ppm, and average lettuce residues of 0.89-2.67 and 1.56-4.19 ppm. There were no measurable PCA or PCTA residues in the soil, although PCA was found in the lettuce; the HCB residues in the lettuce were less than 0.005 ppm. Application of a quintozene-dichloran mixture resulted in comparable quintozene and HCB residues. The average dichloran content of the soil at the time of harvest was 1.77-2.12 ppm.

75-2080. Nalley, L.; Hoff, G.; Bigler, W.; Hull, W. (Florida Div. Health., Vet. Public Health Sect., Jacksonville, FL 32201). **Pesticide levels in the omental fat of Florida raccoons.** *Bull. Environ. Contam. Toxicol.* 13(6): 741-744; 1975. (4 references)

Fat samples from 20 raccoons captured in Southern Florida (Collier and Sarasota Counties) and 4 raccoons captured in Northeastern Florida (Duval County) were analyzed for pesticide residues using electron capture gas chromatography and thin-layer chromatography. Residue levels in all samples were low with no appreciable differences between animals from Collier, Sarasota, and Duval counties, although there were fewer compounds in the animals from Collier County. PCB compounds were not present in any of the Collier or Sarasota County raccoons, but were present in all the Duval County animals. The results suggest that in these three counties, the raccoon populations may have potential as environmental monitors for future increases in pesticide pollution associated with projected development in these areas.

75-2081. Grover, R. (Res. Stn., Agric. Can., Regina, Saskatchewan, Canada). **Adsorption and desorption of urea herbicides on soils.** *Can. J. Soil Sci.* 55(2): 127-135; 1975. (15 references)

The adsorption/desorption potential of several phenylurea herbicides was studied on representative prairie soils, using slurry-type adsorption experiments. The herbicides showed the following order of increasing tendency to be adsorbed: fenuron $<$ monuron $\leq$ monolinuron $<$ metobromuron $<$ diuron $\leq$ linuron $\leq$ chlorbromuron. The relative adsorption of each herbicide on various soil types was significantly correlated with the soil organic matter content, but not with the clay content. The relationship between the k value and the soil organic matter content was found to be of the exponential type. The extent of adsorption was also inversely related to the order of their water solubilities. THe urea herbicides were readily desorbed by water from the low to medium organic matter content sandy loam and heavy clay soils, but not from a loam with very high organic matter content. It is suggested that the relative adsorption/desorption potential of the herbicide may provide a mechanism by which soil applied herbicides can be biologically inactivated more readily in soils of high organic matter content. (Author abstract by permission)

75-2082. Smith, A. E.; Emmond, G. S. (Res. Stn., Agric. Can., Regina, Saskatchewan, Canada). **Persistence of linuron in Saskatchewan soils.** *Can. J. Soil Sci.* 55(2): 145-148; 1975. (10 references)

The persistence of linuron, at rates equivalent to 2.2 kg/ha, was studied at four sites in Saskatchewan using small field plots. Following applications made in May 1972, plots were sampled regularly and the residues remaining in the 0- to 5- and 5- to 10-cm soil levels extracted and determined colorimetrically. By November 1972, between 28 and 42% of the applied linuron was recovered from plots at the four locations. Losses over winter were slight with approximately 30% of the initial herbicide treatment being recoverable from all soil types in May 1973. Linuron residues were still detectable in plots at all sites 18 mo after application. During winter persistence

studies, 50-60% of the linuron applied in October 1972 was recovered from plots in May 1973, while 30% was detected in May 1974 following October 1973 treatment. In all samplings, linuron was found in the soil from the 0- to 5-cm level, with less than 5% of the initial applications being observed in the 5- to 10-cm depths, thus indicating negligible leaching under field conditions. (Author abstract by permission)

75-2083. Chisholm, D. (Res. Stn., Agric. Can., Kentville, Nova Scotia, Canada). **Persistence of chlorfenvinphos in soil and its uptake by some crops.** *Can. J. Soil Sci.* 55(2): 177-180; 1975. (11 references)

Chlorfenvinphos (Birlane, diethyl 1-(2,4-dichlorophenyl)-2-chlorovinyl phosphate) applied broadcast to field plots at 5.6 kg/ha a.i. (56 kg/ha Birlane 10G) 4 days prior to seeding resulted in traces of the parent compound in beets (*Beta vulgaris* L.), potatoes (*Solanum tuberosum* L.), carrots (*Daucus carota* var. *sativa* DC), parsnips (*Pastinaca sativa* L.), and rutabagas (*Brassica napobrassica* Mill.) at harvest. The α-isomer was found in all crops examined except beets at approximately 0.01 ppm. The β isomer was found in all crops with carrots and parsnips containing 0.09 and 0.06 ppm, respectively. Chlorfenvinphos concentrations in treated soil declined 73% during the 23-wk growing season following pesticide application, but trace residues were detected in the soil 4 yr after application. (Author abstract by permission)

75-2084. Mueller, W. P.; Korte, F. (Inst. fuer Oekol. Chemie der Gesellschaft fuer Strahlen- und Umweltforsch. mbH, Munich, Germany). **Microbial degradation of benzo-[a]-pyrene, monolinuron, and dieldrin in waste composting.** *Chemosphere* 4(3): 195-198; 1975. (10 references)

The concentration of xenobiotics in solid waste and their degradation in waste composting were investigated using benzo-[a]-pyrene, monolinuron, and dieldrin. The xenobiotics were sprayed onto ground waste in concentrations similar to realistic conditions ranging from 10 to 20 μg/g Benzo-[a]-pyrene withstood the composting process to at least 99.5%. No degradation by microorganisms was observed in the extractable matter. Monolinuron/Aresin was demethylated in small amounts to *N*-methoxy-*N'*-4-chlorophenyl-urea; 86.2% of the extractable radioactivity was unaffected starting material. Dieldrin remained unaffected to at least 97.3%. The xenobiotics withstood the degradation by saprophytic microorganisms in waste composting. Particularly benzo-[a]-pyrene as a ubiquitous pollutant of high carcinogenity remained unaffected. Dieldrin as a conversion product of aldrin is also a persistent compound which is not further transformed to biodegradable substances under the described conditions.

75-2085. Hiranpradit, H. (Virginia Polytech. Inst. and State Univ., Blacksburg, VA). **Atrazine movement with water and effects of contaminant levels on non-target organisms.** *Diss. Abstr. Int.* 35(12): 5737B; 1975.

Field studies on the migration and degradative disappearance of atrazine from "no-tillage" and "conventionally planted" corn plots were made. Atrazine was applied at a rate of 4.5 kg/ha to both types of algae plots. Atrazine loss with run-off water was induced by sprinkler irrigation. Actual surface run-off occurred in all conventionally planted plots when approximately 3.3 cm of water were applied. Surface run-off did not occur in any no-tillage plots after approximately 13.5 cm of water were applied. Average atrazine concentration in run-off water induced by sprinkler irrigation was 1.77 ppm from conventionally planted, treated plots and 0.41 ppm from no-tillage, treated plots. Total atrazine loss with run-off water induced by one sprinkler irrigation was 73.93 mg/9 m^2 for no-tillage, treated plots. These accounted for 1.7 and 0.5% of the total dosage of applied atrazine, respectively. From conventionally planted plots, average atrazine concentration in run-off water induced by nine rains ranged from 0.16 to 0.58 ppm. The total loss of atrazine with run-off water induced by nine rains was 165.85 mg/9 m^2 which accounted for 3.9% of the total dosage of atrazine applied. No such run-off occurred in the no-tillage plots. Concentration of atrazine detected in eroded sediment induced by each of the nine rains ranged from 0.15 to 0.86 ppm. Atrazine loss with eroded sediment induced by the nine rains was 5.63 mg/9 m^2 which accounted for 0.13% of the total dosage of atrazine applied. No atrazine was detectable in the soil samples collected from untreated plots of both conventional and no-tillage practices. Appreciable amounts of atrazine were detected in samples collected from treated plots for both the conventional and no-tillage practices at all soil depths. In conventionally planted, treated plots, atrazine concentrations of 0.045, 0.041, 0.033, and 0.0033 ppm were detected at 0 to 20.3, 20.3 to 40.6, 40.6 to 61.0 and 61.0 to 81.3 cm depths, respectively. In no-tillage treated plots, respective concentrations of 0.017, 0.025, 0.011, and 0.021 ppm were detected at 0 to 20.3, 20.3 to 40.6, 40.6 to 61.0, and 61.0 to 81.3 cm depths. Overall, the no-tillage practice gave higher yields and there was greatly minimized run-off of herbicidal chemical as well as eroded sediment. Surface run-off was obvious under the conventional system of corn culture. This run-off was reduced to the minimum or almost none at the time when the crops were large enough to produce a canopy and mulching effect over the entire cropping area. (Author abstract by permission, abridged. Copies of the thesis are available from University Microfilms, Order No. 75-11,940.)

75-2086. Stolfi, E.; Alonso, A. H.; Mendizabal, A.; Zubizarreta, E. (Sect. Pesticides, Fac. Med., Univ. De Buenos Aires, Buenos Aires, Argentina). **Pesticides chlores de l'accouchee et du cordon ombilical des nouveau-**

nes. [**Chlorinated pesticides in mothers and umbilical cords of newborns.**] *J. Eur. Toxicol.* 7(5-6): 330-338; 1974. (13 references) (French)

A study of the incidence of biological contamination by certain chlorinated pesticides was made in mothers and newborns. Residue levels in the blood of the umbilical cord were much lower than in the mothers, indicating a difference in metabolism or in the effectiveness of the placental barrier. Another hypothesis suggests that blood levels reflect the quantity of pesticides in adipose tissue, where residue accumulation occurs. In comparison studies it was noted that there is an exponential increase in pesticide residues when the infant comes into direct contact with contaminated food stuff. The studies offer a statistical basis for comparisons with future studies of children intoxicated by pesticides and will also serve as social and economic statistics from Buenos Aires. BHC, heptachlor, heptachlor epoxide, aldrin, dieldrin, *p,p'*-DDE, *p,p'*-DDT, and *o,p'*-DDT are all being studied. The figures must allow for household use of DDT and BHC as well as environmental contamination.

75-2087. Caselli, R. (Author address not given). **Il problema dei residui nelle carni per il consumo umano.** [**The problem of the residues in meat for human consumption.**] *Ind. Aliment. (Pinerolo, Italy)* 13(7-8): 87-88,90-91,94-95; 1974. (Italian)

Food contamination as a public health threat often stems from animal feed contaminated by pesticides used to safeguard its growth. Substances which threaten the quality of meat products have different origins with the same harmful results. The European Economic Community (EEC or Common Market) is attempting to legislate toxicological tolerances for grain feeds. The first such attempts are specifically directed against the over-use of malathion, carbaryl, lindane, parathion, aldrin, and heptachlor. Mercury products have also come under closer scrutiny, as have the toxic effects of industrial smoke near farm areas. Antibiotics such as penicillin, tetracycline, erythtomycin, and hygromycin must also be controlled because of potentially dangerous effects on milk and milk products.

75-2088. Richou-Bac, L. (Lab. Cent. Hyg. Aliment., Serv. Vet., Paris, France). **Les residus de pesticides et de polluants organo-chlores dans les denrees d'origine animale.** [**Residues of pesticides and organochlorine pollutants in food products of animal origin.**] *Ind. Aliment. Agr.* 91(3): 193-202; 1974. (French)

Organochlorine pesticide residues, especially those of BHC, HCB, heptachlor epoxide, and dieldrin, are presently among the main contaminants of food products, especially milk and dairy products, in France. Although the degree of contamination has decreased considerably since administrative actions were taken in 1969, the pesticide residues are still a problem. Industrial and inadvertant veterinary pollution with organochlorine compounds has diminished. Origins of the contamination are basically through use of the chemicals in the stables and store houses of products, on growing plants which are either ingested by man or fed to cattle, and veterinary therapy. In general, BHC contamination has decreased even though levels vary; heptachlor epoxide has increased particularly in the northern sections as has dieldrin; HCB has remained low. These figures were based on samples of cheeses of various kinds, cream, and butter from scattered provinces. The samples also reflected usage of DDT and its derivatives which has persisted desite prohibitions. Additional studies also revealed the presence of pesticide residues in meats and fish. Measures to prevent further contamination and permissible levels in foods are being considered.

75-2089. Ray, B. (Farm Chem., Ltd., Bombay, India). **Fate of organic arsenicals in soils and plants.** *Int. Pest. Contr.* 17(1): 9-14; 1975. (64 references)

The use of 2 organic arsenicals, monosodium acid methanearsonate (MSMA) and disodium methanearsonate (DMSA), as herbicides in cotton crops is discussed with respect to their fate in the soil and their metabolism and toxicity in plants. In the soil, MSMA is oxidized by microorganisms to inorganic orthoarsenic acid and carbon dioxide or is reduced and methylated by microorganisms to volatile methylarsines, primarily dimethyl arsine. Some of the ortho-arsenic acid is converted to insoluble salts of iron, aluminum, and calcium, and some is converted to volatile methylarsines. The latter are produced in very low concentrations and are transported by air to other areas. They are eventually oxidized in air and the arsenical oxidation products are redeposited in other soils by the actions of gravity and rainfall. The ultimate result of this microbiological metabolism is a redistribution of soil arsenic from areas of high available arsenic to areas of low available arsenic. The amount of available arsenic in a soil is influenced by such factors as soil surface area, organic matter content, ion exchange sites, and the availability of ions such as iron, aluminum, and calcium, which can form water-insoluble arsenical salts.

75-2090. Edwards, V. H.; Schubert, P. F. (Basic Res. Div., Appl. Microbiol. Dep., Merck & Co., Rahway, NJ). **Removal of 2,4-D and other persistent organic molecules from water supplies by reverse osmosis.** *J. Am. Water Works Assoc.* 66(10 Pt. 1): 610-616; 1974. (123 references)

The selectivity of cellulose acetate reverse osmosis membranes was determined for aqueous solutions of several derivatives of 2,4-D. Reverse osmosis shows varying selectivity for pesticide residues depending on the residue, residue concentration, membrane, and the presence of other solutes. Retentions are higher in some cases and lower in others than those obtainable with the competitive sample concentration methods of adsorption or of solvent extraction. 2,4-D retentions by 2.5 and 3.0 cellulose membranes did not exceed 57% and retention was lost rapidly in one case. Initial retentions of the sodium salt never ex-

ceeded 65% and in most cases declined to much lower values ranging from 1 to 51% after passage of a 5 cm layer of solution. Similar results were obtained with membranes of cellulose triacetate or of polyelectrolytes and with an iron complexed form of 2,4-D.

75-2091. Archer, T. E. (Dep. Environ. Toxicol., Univ. California, Davis, CA 95616). **Chemical and thermal effects of parathion residues on spinach.** *J. Food Sci.* 40(4): 677-680; 1975. (4 references)

A study was made to determine the fate of parathion and related compounds on spinach subjected to specific chemical and thermal treatments during cooking procedures. The chemical treatment of the spinach compared well with the usual procedures of cooking spinach in the presence of only table salt and water. Spinach was treated in two separated plots, one receiving 1 gal of water containing 0.971 g parathion (1/2 lb active parathion/acre) and the other treated plot receiving 1 gal of water containing 1.94 g of parathion (1 lb active parathion/acre). The final spinach harvest (in 50 g samples) was washed with 240 ml cold tap water and boiled for 15 min in 240 ml tap water; water containing 2.4 g sodium chloride; 10.5 g acetic acid; 10.5 g acetic acid plus 2.4 g sodium chloride; 2.4 g sodium bicarbonate; and 2.4 g sodium chloride plus 2.4 g sodium bicarbonate. The total residues on the spinach were well within the tolerance level at harvest, in both 1/2 lb and 1 lb/acre samples. Water washing of the uncooked spinach removed mainly aminoparathion, paraoxon, and *p*-nitrophenol and reduced the total parathion residues by approximately 10.7% on the 1/2 lb rate and 8.8% on the 1 lb rate. Cooking the washed spinach for 15 min in boiling water, brine, bicarbonate, acetic acid, and their mixtures reduced the levels of parathion, paraoxon, and *p*-nitrophenol on the cooked spinach by various amounts depending on the cooking solution. Parathion at the 1/2 lb rate was reduced by cooking in water 53.2%, brine 67.0%, bicarbonate 82.0%, acetic acid 68.4%, brine plus bicaronate 50.0%, and acetic acid plus brine 62.5%. Paraoxon and diethyl phosphate were mostly removed below detection limits and about 33.3% of the *p*-nitrophenol was removed from the harvested spinach by washing and cooking. In the cooking broth 13.0%, 12.5%, 7.0%, 16.8%, 11.9%, and 12.5% respectively of the parathion on the washed spinach was found and the aminoparathion, dimethylphosphate, diethyl phosphorothioate, *S*-ethyl parathion, and *S*-phenyl parathion levels were not detectable. Paraoxon disappeared or dropped to very low levels on the cooked spinach and broth samples. The *p*-nitrophenol levels in the cooking broths on the average were about 77.2% of the initial levels. The cooked, treated spinach contained about 54.5% of these amounts. Similar results were obtained for the 1 lb rate samples.

75-2092. Walter, R. H.; Bourke, J. B.; Sherman, R. M.; Downing, D. L.; George, E., Jr.; Karasz, A. B.; Pollman, R. (Dep. Food Sci. Technol., New York State Agric. Exp. Stn., Cornell Univ., Geneva, NY 14456). **Status of DDT in apple pomace for dairy feeding.** *J. Milk Food Technol.* 38(6): 340-342; 1975. (18 references)

Concentrations of DDT currently found in apple pomace in New York State were measured to determine its possible suitability in the dairy regimen. Apples from the 1971, 1972, and 1973 harvests which were grown in the experimental orchards in Geneva, NY and in a distant, privately-owned orchard (Sodus, NY) were converted to pomace. At least 12 samples from each source were analyzed in a given year. There was no evidence of the presence in pomace of TDE, or of more than the generic level of DDE, except for isolated instances in commercial pomace where the concentrations of these metabolites reached 30-100% of DDT. The levels of DDT and metabolites in apple pomace are well below the Food and Drug Administration's action limit of 0.5 ppm. Recommendations on the use of DDT can only be based on actual feeding studies. These have been preceded by residue analyses which have established the probable perennial limits of DDT in pomace at 0.18 ± 0.08 ppm.

75-2093. Mandrik, F. I.; Yakub, G. G. (Moldavian Sci. Res. Inst. Cattle-Breeding and Vet., USSR). **Ostatiki metafosa na sel'skokhozyaystvennykh kul'turakh v usloviyakh Moldavii. [Meatphos residues in crops in the Moldavian SSR.]** *Khim. Sel. Khoz.* 12(10): 764; 1974. (Russian)

The degradation of metaphos (methyl parathion) in stalks and leaves of alfalfa, mangel-wurzel, and corn plants was studied following its application at an expenditure of 1.5 kg/ha. Thin-layer chromatographic analyses revealed metaphos residues for 18 days in alfalfa, for 30 days in corn, and for 23 days in mangel-wurzel. The findings indicate that the waiting period for corn treated with this pesticide should be increased from 25 to 30 days. Zero tolerance is required for metaphos in fodder crops.

75-2094. Solov'eva, E. I.; Lyubivaya, A. I.; Kabanova, N. N. (Ukrainian Sci. Res. Inst. Canning Ind., USSR). **Vliyanie tekhnologicheskikh protsessov obrabotki na soderzhanie karbofosa v ovoshchinykh konservakh. [Effect of technological treatment processes on carbophos content in canned vegetables.]** *Konserv. Ovoschesush. Prom.* 10: 14-15; 1974. (Russian)

The effect of technological treatment processes on carbophos (malathion) residue levels was studied in canned vegetable marrow, tomatoes, and cucumbers. The flesh of the vegetables contained 58 to 80% of the total residue. Washing with water was inefficient regarding the removal of carbophos from the vegetables, and also washing with 0.5% alkaline solution had little effect. Sterilization reduced the residue level by 50-90%, and even by 10% in some cases. Thus, sterilization in the canning process reduces the carbophos residues to levels below the maximum allowable concentration of 1 mg/kg even in highly contaminated produce.

75-2095. Riebel, A.; Beitz, H. (Inst. Pflanzenschutzforsch. Kleinmachnow, Biol. Zentralanst., Berlin, DDR). **Zur Rueckstandsbildung von Aldicarb in Zwiebeln.** [**Aldicarb residues in onions.**] *Nachrichtenbl. Pflanzenschutzdienst DDR* 29(2): 44; 1975. (German)

The aldicarb residue formation in onions was studied for the elaboration of the optimal application conditions of this nematicide. The residues were determined by thin-layer chromatography with enzymatic detection, the sensitivity being 0.01 ppm. The residues at harvest were lowest with values below 0.005 ppm when onions treated in the previous year were used as seed onions, without treatment during the latter vegetation period. The treatment should be done during April, and the nematicide expenditure is limited to 1.6 g aldicarb per running meter. The maximum allowable residue level in onions is limited to 0.1 ppm in view of the high toxicity of aldicarb (LD50 0.93 mg/kg in rats, admissible daily intake 0.0005 mg/kg/day for aldicarb and 0.027 mg/kg/day for aldicarb sulfone, its principal metabolite). This metabolite accounts for 78% of the total residue found after 60 days.

75-2096. Bulkley, R. V.; Shannon, L. R.; Kellogg, R. L. (Iowa Coop. Fish. Unit, Iowa State Univ., Ames, IA 13050). **Contamination of channel catfish with dieldrin from agricultural runoff.** *Natl. Tech. Inform. Serv. PB* 236 416, 1974, 157 p. (105 references)

Dieldrin concentrations in Des Moines River water between April and October ranged from 1 to 50 ng/l in 1971-1973. Peak concentrations in river water usually occurred within one month after corn planting season. Dieldrin levels in aquatic insects and minnows sampled in 1973 were highest in June, decreased in the summer, and increased to higher levels in autumn. Dieldrin levels in catfish muscle varied with size and age of fish but not with amount of muscle fat. Annual and seasonal trends in dieldrin levels in catfish muscle were not consistent for different length groups except that peak levels most frequently occurred in July each year. Biomagnification of dieldrin from catfish food organisms to catfish muscle was not evident. Twenty-eight day exposure to 75 ng/l dieldrin in water resulted in 14-16 in. catfish accumulating more dieldrin in muscle than did 6-9 in. fish. After elimination for 28 days, dieldrin levels in both size groups were nearly equal. When fish were exposed in both food and water, dieldrin from both sources contributed to the total muscle concentration. Large catfish accumulated more dieldrin from food and water than did small catfish but eliminated dieldrin at a similar rate after exposure ceased.(Author abstract by permission)

75-2097. Ahr, W. M.; Daubenspeck, J.; Harry, H. W.; Littleton, T. G.; Holliday, B.; Moloy, J.; Vetter, L. (Dep. Geol., Texas A & M Univ., College Stn., TX). **Resource evaluation studies on the Matagorda Bay area, Texas.** *Natl. Tech. Inform. Serv.* COM-74-11706, 1973, 170 p. (9 references)

The study was designed to furnish information to the General Land Office of Texas to help develop an informational base upon which coastal zone management policy guidelines could be made. The Lavaca-Western Matagorda Bay area contains sediment with combined DDT-DDE values ranging from 2 to 64 ppb. PCBs were not detected in the 35 samples which were analyzed. Sediments in Lavaca Bay are muddier than those in most of Matagorda Bay and the potential to retain sorbed pollutants is therefore greatest in Lavaca Bay. The ship channel through Lavaca Bay acts as a flume for exchanging tidal water between the bay and the Gulf. DDT and DDE are more abundant around the ship channel than on the bay flats - apparently regardless of the kinds of sediments that make up the bay flats. Apparently, the volume of pollutants in the channel area causes the sediments there to have a high charge of DDT/DDE as compared to the bay flats. Organic carbon content of bay sediments did not correspond with the DDT or DDE values from sediment samples. The lack of correspondence in these two classes of data is probably due to the fact that the different analyses were done on samples collected at different times, places, and by different techniques. The quantity of combined DDT/DDE in the Matagorda-Lavaca Bay area ranged between 2 and 64 ppb. Common expected DDT/DDE values in the Lavaca Bay area are from 18 to 25 ppb, and the common expected values for bay flats are 10 to 15 ppb. These values agree with DDT/DDE values in sediments from San Antonio Bay and in sediments from the Laguna Atascosa National Wildlife Refuge near Brownsville. The study area has a DDT/DDE content similar to the above-mentioned areas and PCBs were not detected. Results of this report are useful in extending coastwide baseline values to the study area and if the area is managed with consideration given to the processes of pollution dispersal and retention there should be no major additional threat from chlorinated hydrocarbons. DDT and some PCBs may be very persistent, are retained in the sedimentary substrata, and are concentrated exponentially through the food chain. A few parts per billion may be harmful to wildlife. (Author abstract by permission, supplemented.)

75-2098. Weidner, C. W. (Dep. Agron., Nebraska Univ., Lincoln, NB). **Degradation in groundwater and mobility of herbicides.** *Natl. Tech. Inform. Serv. PB* 239 242, 1974, 69 p. (55 references)

Laboratory studies were conducted to determine the degradation rates for atrazine, alachlor, butylate and picloram stored in groundwater. A significant amount of herbicide degradation occurred over the duration of the experiment. The rate of degradation was dependent on chemical properties of the herbicide, concentration, storage temperature and to a lesser extent the source of the water samples. Butylate showed the largest amount of degradation followed by alachlor, atrazine, and picloram respectively. The 0.072 and 0.72 ppmw concentration samples result in more degradation than the 10 ppmw concentration samples. The samples stored at 25°C resulted in more

degradation than the samples stored at 10°C. Water samples from the Clay Center location showed more herbicide degradation than the other three water sources. While herbicide degradation in groundwater did occur, the rate was much slower than would be expected for the same herbicides in a soil medium. (Author abstract by permission)

75-2099. Farmer, W. J.; Letey, J. (Dep. Soil Sci. and Agric. Eng., Univ. California, Riverside, CA). **Volatilization losses of pesticides from soils.** *Natl. Tech. Inform. Serv. PB* 239 325, 1974, 89 p. (37 references)

The volatilization of pesticides following soil application can be predicted from considerations of the physical and chemical principles controlling concentrations at the soil surface. When concentrations are maintained at a relatively high level, volatilization losses will be determined by the pesticide vapor pressure as modified by adsorptive interactions with the soil. For pesticides which have been mixed with the soil or when lengthy volatilization causes low concentrations at the soil surface, volatilization rates will be determined by the rate at which pesticides move through the soil to the soil surface. When mass flow in liquid water is negligible, volatilization rates are predictable using solutions to the different equations. When mass flow is operative, prediction of volatilization rates is more complex. A computer model has been developed combining both diffusion and mass flow for predicting the volatilization of soil-incorporated pesticides. Temperature gradients in soil significantly affected the distribution of volatile pesticides in soil. Vapor phase diffusion toward areas of low temperature can occur simultaneously with mass flow in liquid water toward areas of high temperature. (Author abstract by permission, edited)

75-2100. Peel, D. A. (Scott Polar Res. Inst., Cambridge, England). **Organochlorine residues in Antarctic snow.** *Nature (London)* 254(5498): 324-325; 1974. (14 references)

Snow samples representing the previous 5-10 yr accumulation were collected during December 1969 from an area 450 km inland from the Halley Bay station in Antarctica. The samples were melted, extracted, and analyzed by gas chromatography for organochlorine residues. Peaks coincident with *p,p'*-DDT and *p,p'*-DDE were found in all samples, the total DDT concentration ranging from 0.1-2.0 x 10^{12} g/g; in all cases, DDE was more abundant than DDT. There were no detectable PCB residues. This data contrasts with earlier measurements made on snow from other Antarctic locations, indicating that more studies of Antarctica are needed. The results also indicate that the Antarctic environment is much more strongly shielded from penetration by PCBs and by DDT and its metabolites. This argues against the idea that the atmosphere is the predominant mode of transport for PCBs on a global scale.

75-2101. Dejonckheere, W.; Steurbaut, W.; Kips, R. H. (Lab. Fytofarm., Fac. Landbouwwet., Rijksuniv., Ghent, Belgium). **Quintozene (PCNB) residues in witloof chicory.** *Parasitica* 30(1): 28-36; 1974. (7 references)

Residue levels of quintozene in witloof chicory were examined in 175 samples, including roots and soil, in the fall (1972). Market samples showed values much lower than Belgian and Dutch tolerance (3 ppm) and Swiss tolerance (1 ppm) but mostly higher than the German tolerance (0.01 ppm). Results of field trials showed that greatly increased residue levels were present when cover soil contained quintozene from previous treatments. The re-use of treated soil for covering roots year after year should be avoided. Another residue found was hexachlorobenzene, present in technical PCNB. It is recommended that treated roots not be used as cattle food.

75-2102. Nef, L.; Zenon-Roland, L. (Cent. Rech. Biol. For., Bokrijk, Belgium). **Lutte contre *Hylobius abietis* L.: remance de divers insecticides appliques par trempage. [Control of *Hylobius abietis* L.: persistence of various insecticides applied by dipping of young plants of *Picea abies*.]** *Parasitica* 30(4): 159-166; 1974. (5 references) (French)

The fate of four chlorinated insecticides applied to young *Picea abies* by dipping was traced during five growing seasons. Trees were regularly sampled for chemical analysis of residues. Residue products decreased slowly. DDT, on a semilogarithmic scale, had a half-persistence time of about 600 days and decreased linearly. Dieldrin, lindane, and heptachlor decreased rapidly at first while the 10-20% residual amounts decreased more slowly. Their overall half-persistence times were between 175 days and 1 yr. The concentrations per surface unit decreased more rapidly than indicated above due to the radial growth of trees. Considering this correction, the half-persistence of DDT is about 400 days. DDT, of all tested substances, showed the highest half-persistence time and the most regular decrease.

75-2103. Beynon, K. I.; Roberts, T. R.; Stoydin, G.; Wright, A. N. (Shell Research Ltd., Sittingborne, Kent, England). **The fate of the herbicide benzoylprop-ethyl in crops grown in treated soils.** *Pestic. Sci.* 5(4): 443-450; 1974. (9 references)

The herbicide benzoylprop-ethyl (Suffix, ethyl-(±)-2-(*N* - benzoyl - 3,4-dichloro - anilino) propionate) is applied post-emergence for the control of wild oats (*Avena* spp.) in wheat. During application some falls onto the soil and in the present work the possible uptake of residues from the soil, particularly by rotation crops, has been studied using radioisotope techniques under indoor and outdoor conditions. Soil application at 1 kg/ha gave lower residues in wheat in the year of application than were found in previous studies using overall foliar-soil application. In the radiochemical experiments soil residues did persist into the following year, but residues in potatoes and wheat grown in these soils, although generally below the limit of determination (0.005 mg/kg), were occasionally just above this level (0.006 mg/kg). On the results of the

present work, residues in rotational crops from soils treated in the previous year are unlikely to reach the limits of normal analytical determination. (Author abstract by permission)

75-2104. Soderquist, C. J.; Crosby, D. G. (Dep. Environ. Toxicol., Univ. California, Davis, CA 95616). **Dissipation of 4-chloro-2-methylphenoxyacetic acid (MCPA) in a rice field.** *Pestic. Sci.* 6(1): 17-33; 1975. (34 references)

The dissipation of the herbicide 4-chloro-2-methyl phenoxyacetic acid (MCPA) in a California rice field was investigated. Samples of water, rice plants, and mud were collected at intervals for 20 days and analzyed for MCPA by established methods for plants and mud, and by a novel method utilizing XAD-2 macroreticular resin for water. Water residues declined to less than 0.01 part/10^6 of MCPA within 14 days after application; plant residues declined from 20 parts/10^6 to 1 part/10^6 within 20 days; mud residues remained constant at about 0.1 parts/10^6. Photolysis of dilute aqueous MCPA solutions with either sunlight or an indoor photoreactor yielded 4-chloro-2-methylphenol as the major product; *o*-cresol and 4-chloro-2-formylphenol also were identified. While photosensitization was observed with water taken from the rice field, microbial degradation proceeded at an even faster rate. All environmental compartments except air contained measurable amounts (>0.01 part/10^6) at some time, but water contained the bulk of the applied MCPA whose eventual disappearance was shown to be due to biological and chemical degradation and not dilution. (Author abstract by permission)

75-2105. Buser, H. R.; Bosshardt, H. P. (Swiss Fed. Res. Stn. Arboric., Vitic., and Hortic., CH-8820 Wadenswil, Switzerland). **Studies on the possible formation of polychloroazobenzenes in quintozene treated soil.** *Pestic. Sci.* 6(1): 35-41; 1975. (21 references)

Treatment of different soils with quintozene at a level of 1000 parts/10^6 and incubation for 24 days at 30°C did not result in formation of polychloroazobenzenes, although pentachloroaniline was found. This negative finding is in line with previous work, where it was shown that azobenzenes can only be formed from substituted anilines with at least one free ortho position. Soil activity was demonstrated by incubation of 3,4-dichloroaniline under similar conditions yielding the expected 3,3',4,4'-tetrachlorazobenzene. Mass fragmentography with a quadarupole mass spectrometer was used for the detection of polychloroazobenzenes. Mass spectra for the synthesized reference compounds are presented. (Author abstract by permission)

75-2106. Smith, D. C.; Leduc, R.; Tremblay, I. (Health Protect. Branch, Health and Welfare Canada, Tunney's Pasture, Ottawa, Ontario, Canada). **Pesticide residues in the total diet in Canada. IV. 1972 and 1973.** *Pestic. Sci.* 6(1): 75-82; 1975. (7 references)

Foods, representing an average Canadian diet, were prepared for eating, made into homogenized composites, each containing one type of produce, and analyzed for pesticide residues and arsenic. The amounts found were at a consistently low level which could contribute approximately 20 μg total pesticide residues and 35 μg arsenic/person/day. (Author abstract by permission)

75-2107. Juszkiewicz, T.; Szprengier, T.; Radomanski, T. (Dep. Pharmacol. Toxicol., Inst. Vet., Pulawy, Poland). **Stezenie rteci w mluku kobiet.** [**Mercury content of human milk.**] *Pol. Tyg. Lek.* 30(9): 365-366, 1975. (18 references) (Polish)

Mercury residues were determined by flameless atomic absorption spectrophotometry (after wet digestion with sulfuric, nitric, and hydrochloric acids) in milk samples collected during the first 4 days post-partum from 101 randomly selected women. They ranged in age between 17 and 40; 38 came from rural, 63 from urban areas. All samples contained mercury with concentrations varying between 0.0011 - 0.0158 ppm (average 0.0059 ± 0.0002 92%. Most of the samples (92%) had concentrations in the 0.001 - 0.010 ppm range which is considered to be of the normal among healthy subjects and does not indicate excessive exposure to mercury. No correlation was found between mercury concentration and health during pregnancy, course of labor or weight of newborn. In the 0.001-0.010 ppm range women working physically showed a higher content (0.0062 ppm) than white collar workers (0.0053 ppm) and those from rural areas higher concentrations (0.0063) than from urban areas (0.0056 ppm). These differences were statistically not significant. Significantly higher ($p < 0.02$) concentrations were found in women >30 years old (0.0081 ppm) when compared to younger women (0.0056 ppm). In 8 of the 101 samples the concentration exceeded 0.010 ppm, 6 of these were from women living in rural areas and all 8 had taken part in preparation of grain for sowing during pregnancy.

75-2108. Mithyantha, M. S.; Rao, K. B.; Biddappa, C. C.; Lillaram, N. T.; Perur, N. G. (Dep. Chem. Soils, Univ. Agric. Sci., Bangalore, India). **Paraquat adsorption on clay minerals.** *Proc. Indian Natl. Sci. Acad.* 40(3): 295-298; 1975. (13 references)

Studies of paraquat absorption were performed on pure samples of metabentonite, montmorillonite, halloysite, and pyrophillite clay minerals. Paraquat was strongly adsorbed on montmorillonite and converted to a form which cannot be extracted by saturated ammonium chloride solution, even when the quantity added is as high as 25.25 mg/g of clay. The differences among the 4 clay minerals with regard to their absorption of the herbicide were considered due primarily to the differences in their C.E.C., strength of the negative charges, and the presence of specific adsorption sites for paraquat. Calcium saturated clays adsorbed slightly higher amounts of paraquat than did H-clays. While in montmorillonite all the her-

bicide added is deactivated, 55 to 63% in the case of metabentonite, 50 to 85% in halloysite, and 71 to 87% in pyrophillite of the total quantity adsorbed are extracted by saturated ammonium chloride and these quantities are considered potentially available for the biocidal action. The remaining quantities are detoxicated and will not cause herbicidal effect.

75-2109. Portmann, J. E. (Ministry Agr., Fisheries, Food, Fisheries Lab., Burnham-on-Crouch, Essex, England.) **The bioaccumulation and effects of organochlorine pesticides in marine animals.** *Proc. R. Soc. London B* 189(1096): 291-304; 1975. (33 references)

The bioaccumulation of organochlorine pesticides in the marine food chain and their effects on the marine animals are reviewed. The major routes of entry of the organochlorine pesticides into the marine environment are via the atmosphere, rivers, sewage outfalls, and sewage sludges; the first of these is the major pathway. The organochlorine pesticide residue levels in the seawater vary and appear to be highest in the surface microlayer. The most significant factor in organochlorine pesticide accumulation in the marine food chain is the first step from water to phytoplankton. Within the food chain, the increase on a lipid basis is generally less than 1 order of magnitude, the body burden of an animal being related primarily to the size of its lipid pool. Organochlorine pesticide contamination appears to have little effect on the planktonic organisms, crustacea, molluscs, marine fish, or seals, although reproductive failure in fish-eating birds has been associated with high levels of DDT, dieldrin, and PCB in many parts of the world. There is some evidence that the peak values for organochlorine pesticides in the atmosphere are now past and that the peak values in the surface waters of the oceans and marine animals have been or will soon be reached. However, residues will continue to be detectable in the sea for many years and peaks may re-occur locally in estuaries.

75-2110. Pearson, C. R.; McConnell, G. (Imp. Chem. Ind. Ltd., Brixham Lab., Devon, England). **Chlorinated C_1 and C_2 hydrocarbons in the marine environment.** *Proc. R. Soc. London B* 189(1096): 305-332; 1975. (14 references)

A range of industrially manufactured chlorinated hydrocarbons derived from C_1 and C_2 hydrocarbons are used as intermediates for further chemical syntheses and outside the chemical industry as solvents or carriers. Those included in the latter category in particular are eventually dispersed into the environment. The distribution of some of these compounds, including chloroform, carbon tetrachloride, trichloro ethylene, perchloroethylene, and trichloroethane, in the environment (air, water, and marine sediments) was investigated. Their accumulation concentrations in fish and other aquatic organisms were studied and compared with acute toxicity levels ascertained in the laboratory. In addition, chemical and microbial degradation processes were studied in the laboratory to help determine the course of their removal from the aqueous and atmospheric environments, and the half lives of some of the compounds were estimated. The results indicate that these compounds are not persistent in the environment, and that there has been no significant bioaccumulation in marine food chains.

75-2111. Nikonorow, M.; Zimak, J. (Dep. Food Anal., Natl. Inst. Hyg., Warsaw, Poland). **Wplyw procesow technologieznych i kulinarnych na przemiany i pozion pozostalosci niektorych insektycydow chloroorganocznych w jajach i przetworach jajecznych. Cz I. Wplyw procesu gotowania na zawartosc i prziany DDT i HCH w jajach.** [**Effect of technological and culinary processes on the changes and residual level of certain chlorinated hydrocarbon insecticides in eggs and egg products. Part 1. The effect of boiling on the content and changes of DDT and HCH in eggs.**] *Rocz. Panstw. Zakl. Hig.* 26(2): 153-158; 1975. (13 references) (Polish)

Gas chromatography was used to determine the changes of DDT and its metabolites, DDE and DDD (TDE), and HCH (BHC) α- and γ-isomer levels caused by boiling eggs. Average levels of DDT and HCH in fresh eggs were 2.252 and 0.142, and 2.231 and 0.136 mg/kg dry matter of boiled eggs. Percent ratios of the substances studied were nearly the same in all samples of fresh and boiled eggs. For DDT:DDE:DDD and γ-HCH: α-HCH, they amounted to 57:33:10 and 84:16, respectively. Boiling eggs for 10 min had no effect on the decrease of DDT and HCH residues.

75-2112. Fitak, B.; Gwiazda, J. (Dep. Food Sci., Inst. Biopharm., Acad. Med., Warsaw, Poland). **Badanie szybkosci rozkladu "Zwiazkow oznaczalnych" metoda klorymetryczna z rezorcyna w roztworach DDVP (dichlorfosu).** [**Determination of the rate of breakdown of "detectable compounds" by the colorimetric method with resorcin in DDVP (dichlorvos) solutions.**] *Rocz. Panstw. Zakl. Hig.* 26(2): 187-189; 1975. (7 references) (Polish)

The colorimetric method with resorcinol in DDVP solutions was used to study the rate of breakdown of "detectable compounds." Determinations were made using aqueous-methanol, and acetonitrile solutions of DDVP. During low-temperature storage in darkness, breakdown occurs with a reduction in the amount of "substances detectable" by the resorcin method. The greatest breakdown after 16 days was observed in the aqueous solution (22%). Methanol showed a 10% breakdown and a 6% breakdown was found in the acetonitrile solution. Breakdown has no significant effect on the results if extraction and determination are performed on the same day.

75-2113. Nose, K. (Inst. Agric. Sci., Min. Agric. and Forestry, Tokyo, Japan). [**Persistence of herbicides and plant growth regulators in soil.**] *Shokucho (Plant Growth Regul.)* 9(1): 2-17; 1975. (Japanese)

Laboratory test data of herbicides and plant growth regulators officially collected for registration and re-registration is examined in regard to persistency in soil. Substances were classified by the types of dissipation with time (decrease in concentration), the types being: linear; convex downward; convex upward; at first slow, then rapid, and again slow; at first rapid, then slow, and again rapid; and those showing fluctuation. Ninety-three chemicals were classified by chemical structure into 18 categories, the number of data was 243. The 6 types of dissipation with time in soil were shown respectively by 108 (type 1), 43 (type 2), 27 (type 3), 21 (type 4), 13 (type 5), and 11 (type 6). Thirty data items could not be classified because of insufficient number of data-points, half-life less than one day, etc. Respective half-lives of each chemical were given with simple consideration on the types of dissipation.

75-2114. Kanagawa Prefectural Office. (Yokohama, Kanagawa, Japan). [**The status of soil pollution by pesticides.**] *Showa 49-Nendo Kogai Hakussho, Kanagawa-Ken (Public Nuisance White Paper 1974, Kanagawa Prefecture):* 248; 1975. (Japanese)

Residues of total DDT, total BHC, and polychlorocyclodienes were determined in 20 soil specimens collected from fields throughout the Prefecture. In twelve of the 20 specimens residues of the above mentioned pesticides were less than the detection limit; however, in eight specimens the residues were detected. No effect was noticed on the absorption of pesticide residues by crops grown in the soil from which the specimen was taken.

75-2115. Webb, W. L.; Schroeder, H. J., Jr.; Norris, L. A. (Dep. Forest Mgmt., Oregon State Univ., Corvallis, OR 97331.) **Pesticide residue dynamics in a forest ecosystem: a compartment model.** *Simulation* 24(6): 101-169; 1975. (7 references)

A computer model of the movement of pesticide residues in a forest ecosystem was developed with emphasis on the potential direct effects on target and non-target organisms. Simulations using the model trace the movement of two herbicides, 2,4,5-T and picloram, through two different environments, one typical of an Oregon forest and the other typical of southern California chaparral. The model is a mix of empiricism and theory. Its major contribution is the consideration, on a somewhat crude scale, of the interaction among normal seasonal changes of an ecosystem, the action of herbicides on rudimentary ecosystem functions, and the effect of the physical environment on the movement of chemical residues. Opportunities for supplementing this model are, seemingly, unlimited. Follow-up work on the toxicity of chemicals on the biota that occupy various compartments is needed. Output from models such as this one can be used to help specify dosage parameters that reflect the ecological context of toxic effects on biota. The model is written in DYNAMO.

75-2116. Rawash, I. A.; Gasaboub, I. A.; El-Gayer, F. M.; El-Shazli, A. Y. (Entomol. Div., Plant Protect. Dep., Fac. Agric., Univ. Alexandria, Alexandria, Egypt). **Effects of plant species, age and part on the disappearance of sevin, nuvacron and malathion residues.** *Toxicology* 4(2): 145-156; 1975. (7 references)

Residues as determined by bioassay using Daphnia or mosquito larvae were in agreement in most cases except sevin (carbaryl) residues at 1 hr and 8 days after treatment of mallow. The mosquito larvae did not record nuvacron (monocrotophos), sevin, and malathion on 45-day old plants on the 8th, 12th, and 24th day, respectively, whereas residues on younger plants affected mosquitoes up to the 12th day and disappeared only on the 24th day. Daphnia continued to show toxicity to the 24th day on younger and older plants. Insecticide residues of nuvacron, malathion and sevin, found on leaves of 30 and 45 day old plants of cotton, Jew's mallow, and kidney beans after 1 hr, 1, 4, 8, 12, and 24 days were estimated biologically by *C. pipiens* larvae and *D. magna*. Residues disappeared more readily on bean pods than on bean leaves. Residues of sevin, malathion, and nuvacron found on the pods 12 days after treatment as indicated by Daphnia were 0.0189, 0.055, and 0.059 ppm, respectively. They are far less than the corresponding residues on bean leaves. The 1 hr residue was higher on younger bean leaves than on mallow and cotton with very few exceptions: nuvacron, malathion, and sevin; 2.125, 11.75, and 95 ppm on cotton leaves; 2.25 and 145 ppm on Jew's mallow and 3.750, 32.500 and 250 ppm on common bean leaves, resp. On 45-day old plants, this picture was completely reversed. One hour deposits of malathion were higher on mallow than on cotton or beans (nuvacron, malathion, and sevin; 2.3, 100 and 140 ppm on cotton leaves, 1,90, 191.15, and 92.86 ppm on mallow leaves, 2.24, 21.5, and 137.5 ppm on common bean leaves, resp.). Nuvacron residues on 45-day old mallow were less than on cotton or beans. Sevin was higher in 1 hr residues on cotton and beans than on mallow. Mallow did not retain insecticides as long as did cotton and bean. The initial concentration of nuvacron was little less than that of sevin and malathion. It was more toxic to mosquito larvae (LC50 0.0016 ppm) than malathion (LC50 ~ 0.0034 ppm) and sevin (LC50 ~ 0.075 ppm). Daphnia were more affected by malathion (LC50 ~ 0.000098 ppm) than by nuvacron (LC50 ~ 0.00024 ppm). Nuvacron was nearly equitoxic to sevin (LC50 ~ 0.00026 ppm) against Daphnia. In spite of this all tested plants, both young and old, retained nuvacron in the smallest quantities in proportion to other insecticides. The 1 hr residues were less on older plants (except cotton) for only nuvacron and sevin: 2 and 94.5, 1.9 and 92.8 ppm, than on younger ones; 2.4 and 137.2, 2.25 and 145 ppm, as indicated by Daphnia and mosquito larvae, resp. This emphasizes that the initial concentration is not the limiting factor for the determination of the 1 hr residue as the initial concentration was much higher on older than on younger plants.

75-2117. Egan, H.; Sawyer, R. (Lab. Government Chem., Cornwall House, London, England). **Contaminants**

in food: analytical problems and achievements. *Toxicology* 4(2): 245-252; 1975.

Pesticide residues in food are basically technological in origin, the pesticide having in the first place been deliberately used by the farmer or grower. The interest in mercury has increased sharply in recent years initially as a result of use of organomercurial compounds as fungicides in agriculture and the timber industry. The principal pesticide interest has for many years been the persistent organochlorine compounds, mainly dieldrin, endrin, DDT, and their metabolites and immediate degradation products. PCBs have also received much attention. Analytical methods based on gas-liquid, thin-layer and more recently high-pressure liquid chromatography, supported as necessary by other techniques including high-resolution mass spectrometry, are in regular and routine service. When used in conjunction with suitable extraction and clean-up techniques, e.g., chromatographic processes, limits of detection down to about 0.05 mg/kg are possible with thin-layer chromatography. With gas-liquid chromatography, the limits of detection vary slightly with the retention times but levels down to 0.001 mg/kg (1 μg/kg) are usually attainable. Organophosphorus pesticide residues for the most part are less persistent and can be detected and estimated by similar methods. However, detection levels are somewhat higher, on the order of 0.003 mg/kg. The PCB compounds are interesting for their ability to interfere with trace organochlorine pesticide residue analyses. The PCBs offer a convenient index of pollution. One method of estimating levels of PCBs has been to measure the total chromatographic peak area on the chart record and interpret this in terms of the weight of *p,p'*-DDE which gives the same response. PCBs are seldom encountered except in marine environments. The limit of analytical detection for PCBs in fish and similar foods is about 0.01 mg/kg or 0.02 mg/l in milk.

75-2118. Zhulenko, V. N.; Georgieva, G. N.; Smirnova, L. A. (Moscow Polytechnical Inst. Meat and Dairy Industries, Moscow, USSR). **Soderzhanie rtuti v organakh a tkanyakh uboynykh zhivotnykh. [Mercury content in organs and tissues of slaughtered animals.]** *Veterinariya (Moscow)* 4: 96-98; 1975. (Russian)

Eight hundred and ten organ and tissue samples from slaughtered cattle from different parts of the USSR were analyzed for mercury contents, originating mainly from organomercurial pesticide residues in forage and water. The age of the animals ranged from 2 to over 10 yr. The mercury levels in organ and tissue samples increased with the age of the animals. The mercury level in kidney samples from 2-3 yr-old animals was 0.007 mg/kg, while 0.036 and 0.048 mg/kg were found in kidneys from 5-6 and 10-yr-old animals, respectively. The accumulation of mercury was most intense during the summer period when the animals were kept on pasture. Correlation was established between the extent of the use of organomercurial pesticides and the mercury levels in cattle.

75-2119. Vasil'ev, A. F. (All-Union Sci. Res. Inst. Chemical Means of Plant Protection, Moscow, USSR). **Ispol'zovanie algoritma kvadratichnogo programmirovaniya Khildreta i D'Ezopo. [Use of Hildreth and D'Esopo's algorithm of quadratic programming.]** *Zavod. Lab.* 40(4): 395-399; 1974. (2 references) (Russian)

The use of Hildreth and D'Esopo's algorithm of quadratic programming in the identification and quantitative analysis of trace quantities is demonstrated by the use of this method in the spectral analysis of a four-component mixture of BHC isomers in acetone. The analytical points in the spectra were arranged uniformly in three ranged (1,000-910/cm, 890-550/cm, and 510-439/cm) that were free from absorption lines of acetone. The findings indicate that the selection of the noise level is critical for the accuracy of the results. At a noise level of 5%, the maximum relative error does not exceed 1%, while the error is 3.3% at a noise level of 10%. The findings indicate that the quadratic programming method is suitable for the quantitative analysis of mixtures with unknown or varying composition, and for the identification of permanent components by means of differential spectra.

See also 75-2122 75-2133 75-2147 75-2157 75-2158 75-2160 75-2185 75-2213 75-2228 75-2232 75-2256

75-2120. Villar, T. G. (Servico de Doencas Pulmonares, Hosp. Escolar de Santa Maria, Avenida Egas Moniz, Lisbon 5, Portugal). **Vineyard sprayer's lung.** *Am. Rev. Resp. Dis.* 110(5): 545-555; 1974. (10 references)

Fifteen cases of vineyard sprayer's lung were analyzed in an attempt to define the various clinicopathologic forms of the disease and methods of diagnosis. All subjects had been exposed to inhalation of Bordeaux mixture for varying periods of time. The clinical diagnosis was lung cancer in three cases, pigeon fancier's lung in one, Hamman-Rich syndrome in one, tuberculosis in five, pulmonary granulomatosis in two, and vineyard sprayer's lung in three. The clinocopathologic groups included subclinical forms, active forms or acute exacerbations of subclinical forms, and chronic forms. The most frequent clinical presentation was that of an insidious onset of general symptoms in which weakness, loss of appetite, and marked weight loss predominated. The most common roentgenographic picture was that of a diffuse, micronodular (miliary) dissemination or a reticulonodular shadowing, predominantly in the lower portions of both lungs. Although history of exposure to fungicidal sprays is fundamental for the diagnosis of vineyard sprayer's lung, the disease may remain subclinical of many years after termination of exposure and be difficult to diagnose. The diagnosis should be confined histologically and by histochemical demonstration of the presence of copper within the lesions.

75-2121. Okonek, S. Hofman, A. (Cent. Detoxication and Poisons Inform., II Med. Clinic, Univ. Mainz, Mainz, Germany). **On the question of extracorporeal hemodialysis in diquat intoxication.** *Arch. Toxicol.* 33(3): 251-257 1975. (23 references)

Extracorporeal hemodialyses were carried out in a female patient with severe diquat intoxication. Diquat clearance was on average 3.17 ml/min. Only 0.84 mg diquat could be eliminated from the blood serum by 11.5 hrs of dialysis. Hemodialysis is therefore not an efficient technique for removing amounts of diquat from the organism that are toxicologically relevant one day after ingestion. (Author abstract by permission)

75-2122. Blus, L. J.; Joanen, T.; Belisle, A. A.; Prouty, R. M. (U.S. Fish Wildlife Serv., Patuxent Wildlife Res. Cent., Laurel, MD 20811). **The brown pelican and certain environmental pollutants in Louisiana.** *Bull. Environ. Contam. Toxicol.* 13(6): 646-655; 1975. (23 references)

Between 1968 and 1973, 415 nestling pelicans were transported from Florida to Grand Terre, Louisiana where they established a small breeding colony. Between 1971 and 1973, 67 eggs were collected from this colony and analyzed for shell thickness, residues of organochlorine pesticides and PCBs, and traces of mercury, zinc, copper, cadmium, lead, and nickel. Because of the current subnormal reproductive success in the colony, the long-term outcome of the transplanting program remains in doubt. The mean pre-1947 eggshell thickness of pelican eggs in Louisiana was 0.554 mm; the thickness of the eggs measured in this study averaged 0.517 mm in 1971, 0.486 mm in 1972, and 0.488 mm in 1973. The pre-1947 thickness was significantly greater than any of the thicknesses measured in this study. Each of the 36 egg contents measured contained measurable residues of p,p'-DDE, p,p'-DDD, dieldrin, and PCBs, and most of the eggs contained measurable quantities of p,p'-DDT and heptachlor epoxide. None of the eggs contained mirex. Small residues of cis-nonachlor were found in all eggs taken in 1972 and 1973, and all but one contained cis-chlordane and/or trans-nonachlor. Toxaphene was found in most 1972 eggs and all 1973 eggs. The heavy metal levels were probably not high enough to pose a hazard to the pelicans.

75-2123. Lareng, L.; Fabre, J.; Cathala, B.; Fabre-Planques, M.; Voigt, J. J.; Counillon, F. (Service de Reanimation respiratoire d'Assistance Medicale d'Urgence, Hospital Purpan, Toulouse, France). **Intoxications mortelles au Paraquat. [Lethal poisonings with paraquat.]** *Concours Med.* 97(4): 680-687; 1975. (36 references) (French)

Three cases of fatal poisoning with paraquat, including one suicide, are reported. All cases were due to the ingestion of paraquat. Digestive symptoms (abdominal pains, emesis, bucopharyngeal and epiglottic ulceration), followed by reversible hepatorenal lesions with such manifestations as oliguria, azotemia, creatinemia, bilirubinemia and jaundice, and fatal tardive pulmonary lesions with sclerosis and refractory respiratory insufficiency were the common features of all three cases. Microscopic examinations of lung tissues revealed characteristic paraquat lung, i.e., early lesions of the alveoli, interstitial edema and hemorrhagic alveolar necroses, followed by cicatrization and cell proliferation with thickening of the alveolar wall, and sclerosis of the alveolar septa. The pulmonary involvement evolved in several subsequent waves, resulting in the simultaneous presence of lesions of different ages. The attack of type II pneumocytes depressed surfactant production. Acute tubulopathy with rapid regeneration of the tubular epithelium, and non-specific hepatic lesions were found on histological examinations.

75-2124. Ryan, S. O. (Iowa State Univ., Ames, IA). **A study of pesticide uses, storage and disposal in Iowa.** *Diss. Abstr. Int.* 35(12): 5931B; 1975.

Pesticide use, storage, and disposal patterns in Iowa were studied. Information was obtained to help develop an effective pesticide safety extension education program. A mailed questionnaire was developed to survey licensed pesticide applicators, pesticide dealers, farmers, and householders throughout the state. Data were obtained from a representative holding. The following conclusions were drawn from the responses: pesticide applicators and dealers felt the strongest over the necessity of restricting

the use of poisonous pesticides; licensed applicators feel the present licensing procedure is unsatisfactory; licensed applicators use the pesticides with the most safety and efficiency; householders tend to use pesticides dangerously; a large percentage of those who use pesticides have experienced undesirable side effects at least once; householders need pesticide education more than any other group and yet have fewer opportunities and contact with educational measures; unwanted and empty pesticide containers are being disposed of in ways which are not considered safe; pesticide dealers and farmers have the greatest disposal problems of empty containers; the majority of users would return empty containers to the place of purchase if the seller encouraged it; the majority of state residents are in favor of establishing disposal centers.

75-2125. Kolmodin-Hedman, B. (Dep. Clin. Pharmacol., Karolinska Inst., Stockholm, Sweden). **Decreased plasma half-lives of antipyrine and phenylbutazone in workers occupationally exposed to lindane and DDT.** *IN: Drug Interactions, P. L. Morselli, S. Garattini, and S. N. Cohen, eds., Raven Press, New York, 1974, p. 249-257. (31 references)*

The plasma half-life of antipyrine was significantly shortened in 26 men occupationally exposed to pesticides, mainly lindane and DDT. Phenylbutazone plasma half-lives were shortened in 14 men exposed mainly to lindane, whereas the half-life of oxazepam was unchanged. Plasma lindane levels in the test subjects, determined by gas chromatography, ranged from 0 to 90 ppb, significantly above those of age- and sex-matched controls.

75-2126. Uchida, A. (Kurashiki Central Hospital, Kurashiki, Okayama, Japan). [**A case of corneo-conjunctival erosion by gramoxon paraquat-dichloride.**] *Ganka Rinsho Iho (Jpn. J. Clin. Opthamol.)* 69(6): 778-779; 1975. (Japanese)

Undiluted liquid formulation of paraquat dichloride (24%) splashed in an eye of a 60-year-old man caused corneo-conjunctival erosion with severe pseudomembranous conjunctivitis, necrotic conjunctivitis, necrotic turbidity of the annular part, and wrinkles of Descemet's membrane as symptoms. Treatment consisted of removing the pseudomembrane twice and administering antibiotics with eye-drops of Minofagen C. The patient recovered with only a slight scar of palpebral conjunctiva. Although the undiluted liquid formulation is neutral, it becomes weakly acidic in water (pH 4.6, when diluted 1000 times). Therefore, part of the symptoms are due to acidic erosion.

75-2127. Bezuglyy, V. P.; Kaskevich, L. M.; Ovsyannikova, L. M. (All-Union Sci. Res. Inst. Hyg. Toxicol. Pesticides, Polymers, and Plastic Materials, Kiev, USSR). **Funktsional'noe sostoyanie gepato-biliarnoy sistemy posle ostroy intoksikatsii polikhlorpinenom.** [**Functional status of the hepatobiliary system following acute poisoning with polychloropinene.**] *Gig. Tr. Prof. Zabol.* 2: 52-54; 1975. (4 references) (Russian)

Follow-up examinations of the functional status of the hepatobiliary system were performed on 68 female farm workers aged 22-50 yr with mild to serious acute poisoning with polychloropinene. The poisonings were caused by working on fields treated with polychloropinene before the expiration of the prescribed waiting period. The clinical examinations performed up to 1.5 yr after the incidence revealed pathological involvement of the liver in 20 cases and significantly increased beta- and gamma-globulin levels. The hepatobiliary pathology manifested itself in dyskinetic changes of the bile ducts, toxic hepatitis of low to medium seriousness with disturbance of the proteosynthetic function of the liver and reduced bile production, and reduced intrahepatic perfusion. The findings indicate that subjects who had undergone acute poisoning with polychloropinene must be under prolonged medical supervision.

75-2128. Anonymous. (Author address not given.) **Apercu sur les pesticides et la sante en 25 points. Les degres divers du risque.** [**Comments on pesticides and health in 25 points. The different degrees of risk.**] *Ig. Mod.* 67(3): 302-304; 1974. (French)

The health hazards of pesticides and of the therapy of acute poisonings with such substances are reviewed. Liquid pesticide formulations are usually more toxic than solid ones. Certain pesticides, such as organochlorine preparations and arsenic accumulate in the organism. There has as yet been no evidence of the deleterious effect of accumulated organochlorine pesticides in the body. The number of poisonings by pesticides worldwide is estimated at some 500,000 with the mortality ranging from 1 to 10%. Accidental poisonings are due to the improper use of pesticides, violations of safety rules, and accidental contamination of food, especially of cereals, flour, and rice. Organochlorine pesticides are being increasingly replaced by less stable organophosphorus and carbamate preparations, many of which are more toxic than the former, and can penetrate into the organism through the intact skin. High doses of atropine are useful in the therapy of poisonings with organophosphorus and carbamate pesticides.

75-2129. Ray, A. C.; Norris, J. D., Jr.; Reagor, J. C. (Texas Vet. Med. Diagnostic Lab., College Station, TX 77840). **Benzene hexachloride poisoning in cattle.** *J. Am. Vet. Med. Assoc.* 166(12): 1180-1182; 1975. (13 references)

Of 174 cattle dipped in an emulsified preparation of benzene hexachloride labeled for plant use, 18 were fatally poisoned. The preparation contained 0.14% active ingredient, gamma isomer of benzene hexachloride (BHC), a normally safe concentration for cattle. Analyses revealed 0.08% gamma BHC in the used dip and 0.5, 7.9, and 198 ppm in liver, kidney, and hairskin specimens, respectively, from a fatally affected cow. Microscopic examination of the freshly prepared dip demonstrated emulsion droplets ranging from 5 to 60 μ in diameter. (Author abstract by permission)

75-2130. Dequidt, J.; Furon, D.; Wattel, F.; Haguenoer, J. M.; Scherpereel, P.; Gosselin, B.; Ginestet, A. (Lab. Toxicol., U.E.R. de Pharmacie, Lille, France). **Les intoxications par l'acetonitrile a propos d'un cas mortel. [Poisonings by acetonitrile. A fatal case.]** *J. Eur. Toxicol.* 7(2): 91-97; 1974. (12 references) (French)

A fatal case of poisoning by acetonitrile vapors in a 19-yr-old laboratory assistant is reported, and the etiology of the poisoning and the metabolism of acetonitrile are discussed. Epigastric pains, nausea, emesis, coma, hypotension, and convulsions were the first symptoms of the poisoning. Hyperazotemia, hyperglycemia, albuminuria, increased lactate dehydrogenase level and absence of alkaline phosphatase in the cerebrospinal fluid were determined. The acetonitrile, cyanide, and hydrocyanic acid levels in the urine were found to be 31.3 mg/l, 460 μg/l, and 105 μg/l, respectively. The corresponding levels in the blood were 1,176 μg/100 ml, 87 μg/100 mkl, and 1,038 μg/ml. These findings promoted the administration of hydroxocobalamin and dicobalt edetate. The patient died in cardiovascular collapse after 4 days. Densification of the inferior lobes of the lungs, and total diffuse necrosis of the brain were detected on autopsy. The observations indicate the in vivo metabolism of acetor itrile into hydrocyanic acid which is the etiological factor of the poisoning. The efficiency of prolonged antidote treatment with hydroxocobalamin and dicobalt edetate, based upon the progressive liberation of hydrocyanic ions, continues to be hypothetical.

75-2131. Suchel, A.; Fauvet, A. (Centre Anti-Poison, Hospital Edouard-Herriot, Lyon, France). **Etude sur les intoxications par les insecticides organophosphores. A propos de 26 observations. [Study of poisonings by organophosphorus insecticides. A review of 26 cases.]** *J. Eur. Toxicol.* 75(5-6): 300-301; 1974. (French)

Twenty-eight cases of acute organophosphorus insecticide poisoning which occurred in the Lyon region during 1969-1973 are analyzed. Eighteen cases of accidental poisonings were due to the agricultural or domestic use of insecticides or to industrial exposure. Two of the 10 cases of suicidal poisoning were fatal. The symptomatology of all poisonings was characterized by the muscarinic syndrome with nausea, emesis, colic, diarrhea, respiratory and secretory disturbances, and miosis. The nicotinic syndrome, though being less manifest, represented notwithstanding the major risk of the poisoning. The cholinesterase activity had no realistic diagnostic value in these acute poisonings. Diffuse visceral congestion, massive pulmonary edema, and cerebral hemorrhage were found on autopsy in all lethal cases.

75-2132. Cupp, C. M.; Kleiber, G.; Reigart, R.; Sandifer, S. H. (Sect. Preventive Med., Med. Univ. South Carolina, Charleston, SC 29401). **Hypothermia in organophosphate poisoning and response to PAM.** *J. S. C. Med. Assoc.* 71(5): 166-168; 1975. (3 references)

A 16-year-old white male mistakenly ingested a mouthful of a canine mange-mite medication. He presented at the hospital 90 min later with abdominal cramps, nausea, vomiting, weakness, muscle twitching, and apprehension. Gastric lavage was performed and he was given 1 mg atropine i.v. A marked hypothermia (94.2°F) disappeared within 2 hr. The patient's plasma and red blood cell cholinesterase levels were greatly depressed, and he was subsequently treated with PAM (1 gm, i.v.) and atropine (1-2 mg, i.v.), the latter being given hourly over the following 48 hr. The day after admission, the patient developed neurologic symptoms and tachycardia; atropine was continued and sedation with Thorazine was begun. He was drowsy but oriented the following morning and his mental status cleared completely following cessation of atropine treatment. The ingested material was identified as Dermaton. Hypothermia such as observed in this patient is an early sign of severe organophosphate poisoning which indicates a marked effect on the hypophyseal thermoregulatory mechanism. Mental aberrations and behavioral changes in patients on maintenance atropinization may indicate over-atropinization. Atropine should be discontinued if muscle strength is grossly normal and the pupils dilated or normally reactive.

75-2133. Knorr, D. (Inst. Lebensmitteltechnol., Hochschule fuer Bodenkultur, Vienna, Austria). **Tin-resorption, peroral toxicity and maximum admissable concentration in food.** *Lebensm.-Wiss. Technol.* 8(2): 51-56; 1975. (67 references)

The toxicity of tin and its reabsorption through the use of fungicides and bactericides are discussed. Tin and tin compounds have different toxic effects. While the toxicity of organic tin compounds is documented, little is known on the toxic effects of metallic tin and inorganic tin compounds. Recommended as maximum working place concentrations are 0.002 mg/m air for inorganic tin compounds and 0.001 mg/m air for organic tin compounds. A clinical reaction has occurred in persons ingesting citrus juices with a tin content of 200 to 400 mg/kg and exposed to traces of parathion. A combination of tin tartrate with parathion or paraoxon affected mortality in white mice. Small doses of parathion and its metabolite, paraoxon, affected the toxicity of tin appearing in tartrate form in orange juice. Pesticide residues in canned vegetables affect can corrosion and consequently the dissolution of tin.

75-2134. Karimov, V. A. (Dep. Ind. Pathol., Uzbek Sci. Res. Inst. Sanit., Hyg., and Occup. Diseases, USSR). **Rol' vitaminov C i B1 v terapii khronicheskikh intoksikatsiy pestitsidami. [Role of vitamins C and B1 in therapy of chronic poisoning with pesticides.]** *Med. Zh. Uzb.* 2: 6-12; 1974. (Russian)

The dynamics of vitamins C and B1 in the blood and urine of patients with sequelae of acute poisoning, and with chronic poisoning by pesticides, as well as in rabbits chronically poisoned with 1/20 LD50 of rogor and lindane

was studied along with the therapeutic value of vitamins C and B1 in chronic poisonings by rogor and lindane in rabbits. Significant reduction of the blood and urinary vitamin C levels, and significant increase in the vitamin B1 levels in the blood and urine were established in the patients and the test animals. Rabbits poisoned with a mixture of rogor (3.8 mg/kg) and lindane (3.1 mg/kg) for 3 months were treated with 30 mg/kg doses of vitamin C and 2 mg/kg of vitamin B1. Vitamin B1, and especially vitamin C significantly improved the detoxifying function of the liver. Vitamin C normalized the vitamin C level in the blood, while vitamin B1 was less efficient in this report. While vitamin B1 further increased the vitamin B1 level in the blood, vitamin C reduced the latter. The increased alkaline phosphatase levels in the blood were reduced by vitamin C, and further increased by vitamin B1. The findings indicate that unlike vitamin C, vitamin B1 should not be used in the therapy of chronic poisonings with pesticides.

75-2135. Plakhova, A. G.; Vengerskaya, Kh. Ya.; Mayorova, T. N. (Tashkent Med. Inst., Tashkent, USSR). **Gigienicheskaya kharakteristika usloviy truda v mery profilaktiki pri rabote s kotoranom. [Hygenic features of labor conditions and pophylactic measures for work with cotoran.]** *Med. Zh. Uzb.* 2: 17-20; 1974. (Russian)

Data on the toxicity of fluometuron is presented, and studies of the hygienic features of the labor conditions and prophylactic measures for work with this pesticide are described. The oral LD50 was 810 mg/kg, and the no-effect and toxic concentrations in the air were found to be 558 and 1,345 mg/m³. The toxic concentration in repeated inhalation for 4 hr periods is 250-263 mg/m³. Analyses of air samples from different places during the preparation of fluometuron suspension and application during sowing revealed concentrations of 12-60 mg/m³ during the solution preparation, and lower concentrations in the zone of respiration of the tractor driver and sowers.

75-2136. Nazareth Rabello, M.; Becak, W.; De Almeida, W. F.; Pigati, P.; Ungaro, M. T.; Murata, T.; Pereira, C. A. B. (Servico de Genetica, Inst. Butantan, Sao Paulo, Brazil). **Cytogenetic study on individuals occupationally exposed to DDT.** *Mutat. Res.* 28(3): 449-454; 1975. (13 references)

Workers from three insecticide plants in direct contact with 2,2-bis(β-chlorophenyl)-1,1,1-trichloroethane (DDT) did not differ significantly in the frequencies of cells with chromosomal aberrations when compared with controls from the same plants but not in direct contact with the drug. The same was true when a group of workers from one plant was compared with a control group from the Instituto Butantan, with no history of occupational exposure to DDT. Yet when the control group from one of the three plants, which showed high DDT plasmic levels, was added to the group in direct contact with the insecticide, the frequency of cells with chromatid aberrations was significantly higher, suggesting that DDT causes chromatid lesions. A positive correlation was found between DDT levels and times of exposure, but being in direct or indirect contact with DDT was not always correlated with the degree of contamination. (Author abstract by permission)

75-2137. Davies, J. E. (Univ. Miami Sch. Med., Miami, FL 33152). **Pesticides epidemiological field studies.** *Natl. Tech. Inform. Serv.* PB 237 347, 1974, 50 p. (10 references)

The use of multi-residue techniques for urinary metabolites appeared to provide the key to assessing worker exposure to organophosphate plus carbamate pesticides. The findings of Shafik et al. were corroborated, and highly significant inverse correlations of cholinesterase levels with the dialkyl phosphate urinary metabolites were demonstrated under conditions of work exposure to the more toxic organophosphates such as the parathions and phosdrin. Diethyl phosphate, diethyl thiophosphate, and their methyl homologs were the only alkyl phosphates regularly found in these occupational exposures. Following 8 hr of occupational exposure to Dursban (chlorpyrifos), the appropriate dialkyl phosphate and phenolic derivatives persisted in the urine for 36 hr. and longer. These two groups of metabolites were exceedingly informative in acute pesticide poisoning and provided etiologic specificity and information on the continuing need for atropine therapy. Severe and protracted illness was observed following intoxication by more polar and fat soluble organophosphates, especially diethyl dichlorophenyl phosphorothioate (VC-13, dichlofenthion). This pesticide and its metabolites were detected in serum and in urine 48 days after exposure. Additionally, air sampling of the South Florida environment confirmed the disappearance of DDT and its metabolites. (Author abstract by permission)

75-2138. Ohto, K. (Dep. of Ophthalmol., Asama City Hospital, Saku City, Nagano Prefecture, Japan). **[Long term follow up study of chronic organophosphate pesticides intoxication (Saku Disease) with special reference to retinal pigmentary degeneration.]** *Nippon Ganka Gakkai Zasshi (Acta Soc. Ophthalmol. Jpn.)* 78(5): 37-45; 1974. (43 references) (Japanese)

Organophosphate pesticides can cause severe eye damage after chronic exposure. Ocular signs and symptoms were analyzed from epidemiologic and experimental viewpoints and diagnostic criteria proposed. Twelve hospitalized patients suffering from eye injuries caused by pesticides were charted concerning visual acuity, refraction, cholinesterase activity, residues of pesticides in the blood, and fundus examination, including optic disc, retina, and vessels. Fluorescent microangiography was carried out and electroretinography attempted. The results evidenced that the prognosis was not good relative to restoration of vision and that all 12 cases had definite impairment of retinal function. Two of the cases showed progressive pigmentary degeneration of the retina without family consanguinity. Although extensive studies

were also performed on family members, no cause other than pesticide exposure could be found. Visual acuity which had been reduced to as little as 20/200 improved to 20/50 after administration of pralidoxime and atropine. Success of this treatment provided confirmatory evidence for the implication of organophosphorus compounds.

75-2139. O'Brien, L.; Huge, T. L. (American Sanitation Inst., St. Louis, MO). **Don't make a mistake with residuals.** *Pest Control.* 43(6): 12-13; 1975.

New regulations concerning the use of residual insecticides in food and beverage processing plants are discussed. The 1968 regulation forbidding the use of residual insecticides in food processing plants was modified to allow for crack and crevice treatment. This includes areas for receiving, sorting, packing, canning, bottling, wrapping, boxing, and preparing food. Application can be made by applying small amounts of insecticide directly in cracks and crevices using equipment capable of delivering a thin stream of insecticide in points between different elements of construction, between equipment and floors, openings leading to voids and hollow spaces in walls, equipment legs and bases, conduits, motor housings, and junction or switch boxes. In areas other than edible products areas, these residuals can be used on all surfaces where insects are likely to crawl, as long as they are not applied as a space spray, a fog, or directly on the food. It is still recommended that food processing plants use synergized pyrethrin insecticides in the edible products areas as a contact insecticide.

75-2140. Mampe, C. D. (Pest Control Magazine, Cleveland, OH 44102). **Answers [On applicator certification.]** *Pest Control.* 43(6): 30; 1975.

The provisions of the Federal Act for certification of pesticide applicators are discussed. The Federal government set general guidelines for the states to follow, but each state prepares its own exam and does the actual certifying. All personnel who supervise restricted pesticide applications must be certified and are designated as certified applicators. They must train other personnel and maintain records to prove it. Training materials are available from the National Pest Control Association and correspondence courses are offered by Purdue and Penn State Universities. Personnel already holding licenses by states may be exempt from taking certification exam if the Environmental Protection Agency approves the state's plan. Reciprocity is up to the individual states.

75-2141. Bouron, H. (Author address not given.) **Interdiction d'emploi en agriculture des composes arsenicaux insoluble et des composes organiques de l'arsenic. [Prohibition of agricultural use of insoluble arsenic compounds and organic arsenic compounds.]** *Phytoma* 250: 34-35; 1973. (French)

The agricultural use of insoluble arsenic compounds, such as lead arsenate and calcium arsenate, as well as of organic arsenic compounds was prohibited in France by decree on May 24, 1973. This measure was prompted by the specification of zero tolerance for arsenic in apples in West Germany, the major importer of apples from France. The arsenic residues in French apples range from 0.01 to 0.03 mg/kg, while laboratories in West Germany revealed values up to 0.3 mg/kg in certain samples.

75-2142. Leski, R. (Inst. Organic Industry, Pszczyna, Poland). **Pestycydy a pszczoly. [Pesticides and bees.]** *Postepy Nauk Roln.* 22/17(1/150): 83-95; 1975. (Polish)

Poisoning of bees with fungicides, herbicides, and insecticides is a serious problem in Poland and has far reaching economic consequences. A marked reduction in apiaries and stocks of bees caused a 10-15 million zloty loss annually, i.e., 2.5-4% of value of apicultural products (honey and wax). In addition, because of their important role of pollination of certain crops resulting in significant increase in yield (30-40% for rape seed), the decrease in number of bees causes a severe loss, estimated at 100-150 million zloty anually in agricultural crops. Since the reduction in number of bees is a progressive process, it can be anticipated that these losses will continue to grow unless greater care is taken when applying pesticides. The most important factors in poisoning of bees are the application of pesticides when plants are in bloom, when weeds in the vicinity of crops are in bloom, or when a variety of crops which come to bloom at different times are planted in close proximity and sprayed at different times; use of systemic pesticides which are later ingested by bees with the nectar; application of pesticides from the air; transfer to adjoining areas by wind; contaminated water and puddles; use of machinery which has been contaminated by previous use of toxic materials. The most commonly employed compounds have been classified as to degree of toxicity and duration toxicity for bees. The least toxic are foschlor, kamfochlor, melipax, metox, roztoczol, thiodan, and toxaphene. Since toxicity varies under different conditions (temperature and humidity), it is suggested that these factors be taken into careful consideration when applying a pesticide.

75-2143. Yoshida, Y.; Kono, K.; Harada, A. (School of Public Health, Osaka Med. College, Osaka, Japan). **[Cases of suspected methyl bromide poisoning in harbor workers and a survey of their occupational environment.]** *Sangyo Igaku (Ind. Med.)* 17(1): 3-10; 1975. (9 references) (Japanese)

A survey of occupational environment and medical examinations were carried out on harbor workers engaged in unloading lard, tallow, and copra and in fumigating copra with methyl bromide in specially equipped warehouses. The workers had multiple complaints of nervous symptoms such as irritation and headache. The concentration of methyl bromide in the working environment was less than the permissible one and could not be

detected by the detection tube nor by GC. It was not detected in the expired air of workers who finished working. It was noticed that the workers had overeaten fats; their liver dysfunction and disturbance of liver function could have been due to excessive intake of fats. Clinical and subjective symptoms of nervous system differed from those specially due to methyl bromide; the diagnosis was supported by detailed examination including EEG. The cause was attributable in part to irregular work. The reconsideration of necessity and methods of fumigation of these raw fats is necessary.

75-2144. Takahashi, M.; Akaboshi, S.; Nishiya, N. (Second Internal Med. School, Fac. of Med., Osaka Univ., Osaka, Japan). [**On occupational intoxication caused by insecticides in persons engaging in pesticide application for pest control.**] *Sangyo Igaku (Ind. Med.)* 17(1): 52-53; 1975. (Japanese)

The patients were males between 28 and 29 years old and had occupational histories of 4 months to 13 years of applying diluted pesticide from a tank lorry on garbage disposal stations. The pesticides used were mainly organophosphates, especially dichlorvos. The patients did not wear protective masks. The major subjective symptoms of which they complained were head-ache, forgetfulness, impatience, palpitation, etc. Clinical findings were specific skin diseases such as polymorphic exudative erythematus exanthema and ichthyosis type exanthema, abnormal EEG, abnormal electromyogram, and slight disturbance of liver function. These symptoms would be caused by chronic intoxication by dichlorvos, fenitrothion, etc. (Presented at XIV Meeting of Kinki Soc. Health, Nov. 16, 1974, Nara.)

75-2145. Nakabayashi, H.; Aga, N.; Hara, I. (School of 1st Pathology, Fac. of Med., Mie Univ. Tsu, Mie, Japan). [**Two cases of paraquat poisoning—a case of occupational poisoning in a 59-year-old man and of suicide by a 24-year-old woman.**] *Sangyo Igaku (Ind. Med.)* 17(1): 53; 1975. (Japanese)

A male, aged 59, applying insecticides and herbicides on parks, streets, trees, bushes, and sewerages from Oct. 1970 to May 1972, complained of persistent headaches. During application of paraquat on May 24, 1972, he complained of headache, ocular hyperemia, pains in throat, coughing, then suffered amnesia, hallucination, and neurosis. Clinically, he showed chronic bronchitic roentgenogram, moderate obstructive pulmonary disturbance, higher value of BSP (on lung functional examination), reduction of PSR, and loss of sensations in right extremities. He was diagnosed as suffering from intoxication from organophosphorus pesticides and paraquat. A female, aged 24, committed suicide with paraquat. Semiconsciousness, vomiting, and nausea appeared at first. Diffuse shadow on chest roentgenograph became stronger, and she died due to respiratory failure 20 days after swallowing paraquat. Findings on autopsy were: pneumonia with squamous epithelial metaplasia of bronchioli, necrosis centered on hepatolobules and hepatic stagnation, turbid swelling of kidney tubules, diffuse and scattered necrosis of heart muscles, chronic thyroiditis, knotty hyperplasia of adrenal, and reduction in number of gastromucosal gland and partial erosion.

75-2146. Carter, L. J. (Author address not given.) **Controversy over new pesticide regulations.** *Science* 186(4167): 904; 1974.

The Environmental Protection Agency has proposed controversial pesticide regulations which would suspend most uses of aldrin and dieldrin and possibly cancel the use of heptachlor and chlordane. A key provision in the proposed regulations would establish a presumption against registration either new or continued of any pesticide with extremely high acute toxicity characteristics or with evidence of oncogenicity, teratogenicity, or mutagenicity in laboratory or field tests. The presumption can be rebutted, but the applicant must sustain the additional affirmative burden of proof and prove either that the risk is not as great as it appears, or that the benefits outweigh the risks. The decision in the aldrin-dieldrin case was based on conclusive evidence that these pesticides induce tumors in several strains of mice; the manufacturer of the pesticides disputes the validity of using mice as an index for carcinogenicity. The National Agricultural Chemicals Association objects to the method by which the EPA would interpret chronic toxicity data.

75-2147. Rawash, I. A.; El-Gaylar, F. M.; Gaaboub, I. A.; El-Shazli, A. Y. (Entomol. Div., Plant Protect. Dep. Fac. Agric., Univ. Alexandria, Alexandria, Egypt). **Residue analysis of DDT, malathion, and kelthane on pears.** *Toxicology* 4(2): 157-163; 1975. (4 references)

The relation between black spots on pears stored in refrigerators and the residual effect of a DDT, malathion, and dicofol mixture used for the control of pear pests in Egypt was established. Malathion, DDT, and dicofol and their mixture (3:10:5) were applied to pear fruits at the rate recommended by the Ministry of Agriculture. The rate of disappearance of their residues on pear fruits was investigated under refrigerated conditions (2 ± 1° and 47% relative humidity). The same insecticides were tested in higher concentrations (1.5 and 2 times) to determine the effect of insecticides on the black spots usually found on pears after storage. No relation was found between the tested insecticides and the appearance of the black spots. The residues of each material found on pear fruits after 1 hr, 1, 8, 15, 30, and 45 days storage in a refrigerator were estimated biologically by *C. pipiens* larvae and *D. magna*. The highest concentrations of the mixture and of the individual insecticides left higher residues on pears than the lower ones of all the insecticides either as a mixture or alone. Stored pears, refrigerated under the above conditions immediately after treatment with the mixture of insecticides recommended for the pest control of pears, cannot be consumed after 45 days.

75-2148. Zaugolnikov, S. D.; Kochanov, M. M.; Louit, A. O.; Stavchansky, I. I. (Inst. Biophys. Minist. Public Health, Moscow, USSR). **Ekspressnye metody opredeleniya toksichnosti, pdk i otsenka opasnosti Khimicheskikh soedinenii vo vneshnei srede. [Rapid methods for determination of toxicity, acceptable limit concentrations and hazard evaluation of chemical compounds in the environment].** *Vest. Akad. Med. Nauk SSR* 3: 75-83; 1975. (102 references) (Russian)

Interdependence between physico-chemical constants of chemical compounds, indices of toxicity and hazard, and the limiting permissible concentrations (LPC) has been established by numerous investigators using regression-correlation methods. Equations and nomograms were developed to permit a rapid evaluation of LPC and hazard of chemical compounds in industrial surroundings, communities, and in reservoirs used for sanitary and communal needs. Rapid methods of determining these equations and hazards increase the objective significance of toxicological-hygienic evaluation of chemical compounds and the preliminary toxicological examination.

75-2149. Bishop, C. H. G. (4 Coombe Close, Castle Cary, Somerset, England). **Blindness associated with metaldehyde poisoning.** *Vet. Rec.* 96(19): 438; 1975.

A 3-month-old Laborador Retriever bitch was brought to the hospital in a state of convulsion, with profuse salivation, vomiting, and a lack of coordination. The vomit contained metaldehyde pellets. The animal was sedated with i.v. pentobarbitone sodium (200 mg) and acetyl promazine (4 mg); 500 ml of glucose saline with multi B vitamins was administered by slow i.v. drip. The bitch began to regain consciousness and convulse after 6 hr; 200 mg pentobarbitone sodium and 2 mg acetyl promazine were given. Within 2 hr, the bitch was conscious and greatly improved. After 3 more days, she appeared normal but was totally blind. The eyes appeared normal and both showed the light reflex, indicating that the blindness was probably of central nervous system origin. Over the following 3 weeks, the animal's sight gradually returned to normal.

75-2150. Kusic, R.; Raicevic, B.; Spasic, P.; Cosic, V.; Matunovic, A. (Intern. Med. Clin. and Inst. Pathol. Forensic Med., Military Med. Acad., Yugoslavia). **Klinicka i patohistoloska zapazanya u trovanjima paraquatom. [Clinical and histopathological data on paraquat poisoning.]** *Vojnosanit. Pregl.* 31(6): 397-399; 1974. (28 references) (Serbo-Croatian)

A Yugoslav married couple, both aged 67, accidentally swallowed a small amount of Gramoxon, a commercial form of paraquat. The woman died on the fourth day after five resuscitations, the man between the fifth and and sixth day after temporary improvement under treatment. Immediate symptoms were nausea, stomach cramps, dyspnea; later, vomiting and watery stools. On the third day, hepatorenal insufficiency, icterus, oliguria, azotemia were evident. Uremia eventually reached levels above 200 mg%, total serum bilirubin 5-6 mg%. Most prominent histopathological damage was to the lungs (voluminous, hard, heavy, symptoms of nodular and interstitial bronchopneumonia, edema, proliferative bronchiolitis and alveolitis, numerous hemorrhagic foci). Also in evidence were ulcerous esophagitis and gastritis and parenchymal degeneration of the liver and kidneys.

75-2151. Stegaylo, E. A.; Zhivoglyadova, L. M.; Druchevskaya, Z. A. (Kirghiz Sci. Res. Inst. Maternity and Pediatry, Frunze, USSR). **O klinicheskikh proyavleniyakh sluchaynykh otravleniy detey pestitsidami. [Clinical manifestations of accidental poisonings by pesticides in children.]** *Vop. Okhr. Materin. Detstva* 20(3): 84; 1975. (Russian)

Clinical manifestations of accidental acute poisonings in children by organochlorine and organophosphorus pesticides are described. Inhalation of dichlorvos aerosol causes headache, vertigo, pains in the chest, depressed respiration, sometimes cough, tremor of the extremities, motor and coordination disturbances, tachypnea, tachycardia, miosis, sinus arrhythmia, areflexia, emotional lability, increased leukocyte count, significant reduction of the cholinesterase activity. In poisonings with mixtures of DDT and trichlorfon, which may occur due to the ingestion of fruits treated with both pesticides, the poisoning symptoms evolve more slowly. The cholinesterase activity is higher than in normal children, which indicates the prevalence of the effect of the organochlorine pesticide.

See also 75-2109 75-2176 75-2230

75-2152. Howell, J. McC.; Blakemore, W. F.; Gopinath, C.; Hall, G. A.; Parker, J. H. (Dep. Vet. Pathol., Univ. Liverpool, Liverpool, England). **Chronic copper poisoning and changes in the central nervous system of sheep.** *Acta Neuropathol. (Berlin)* 29(1): 9-24; 1974. (17 references)

Chronic copper poisoning was induced in Clun Forest, Sussex Crosses, and Welsh half breed sheep to study brain changes using light and electron microscopy. Twenty nine sheep were given daily oral doses of a 0.5% aqueous solution of copper sulfate; 22 sheep received 20 mg and seven sheep 30 mg/kg body wt. There were 13 controls. Nine of the dosed animals were killed before the haemolytic crisis of chronic copper poisoning developed, 11 sheep died during haemolysis, and nine died subsequent to haemolysis. The central nervous system was fixed either by perfusion or immersion. Light microscopical studies showed that astrocytic changes were present in the haemolytic and post haemolytic groups. In brain tissue fixed by immersion the volume of astrocytic nuclei was significantly greater than that of controls. Vacuolation of white matter was seen as a terminal phenomenon in some but not all the affected sheep. Ultrastructural studies showed that most of the vacuoles associated with nerve fibers were in the outer tongue of oligodendrocyte cytoplasm. The swollen astrocytes contained more glycogen, mitochondria, and endoplasmic reticulum than normal, and the last was often expanded into vacuoles. Serum urea levels were high in animals during the haemolytic and post haemolytic phases. It is possible that the changes in the brain are due to the effects of altered metabolic processes on glial transport mechanisms.

75-2153. Erne, K.; Sperber, I. (Chem. Dep., Natl. Vet. Inst., S-104 05 Stockholm, Sweden). **Renal tubular transfer of phenoxyacetic acids in the chicken.** *Acta Pharmacol. Toxicol.* 35(3): 233-241; 1975. (14 references)

The differential renal excretion of 2,4-D, 2,4,5-T, phenoxyacetic acid, 2-chlorophenoxy-acetic acid, and 4-chlorophenoxyacetic acid was measured in white Leghorn chickens using the differential excretion technique of Sperber. Doses of approximately 50 and 100 μM of either test compound were infused during 3 min into a leg vein and the amounts excreted by the two kidneys determined during consecutive 15 min periods. At the lower dose level the mean apparent tubular excretion fractions (EF) of the compounds, expressed as per cent of the dose, were 11.3, 4.2, 16.5, 22.9, and 12.8, respectively. All the values except that for 2,4,5-T are sufficiently high to be indicative of tubular excretion. The EF values decreased with increasing dose, suggesting the involvement of a saturable mechanism. The test compounds depressed the excretion of phenol red; the effect was most marked with 2,4,5-T.

75-2154. Winbladh, B. (Res. Inst. Natl. Defense, Sundbyberg, Sweden). **Choroid plexus uptake of acetylcholine.** *Acta Physiol. Scand. Suppl.* 396: 55; 1973.

Acetylcholine (ACh) was accumulated by active transport into rabbit choroid plexa in vitro. The transport system demonstrated a high capacity and seemed to be identical to that for choline (Ch). The maximum speed of uptake varied from 10-60 mmol/min/kg. The choroid plexa contained significant cholinesterase (ChE) activity which was localized intravascularly. ACh was not metabolized by the tissue. The cholinesterase inhibitor (ChEI) physostigmine inhibited ACh and Ch uptake, while soman and sarin stimulated the uptake. In the case of soman, the stimulation of ACh uptake increased with increasing ACh concentration. Soman enhanced the release of ACh from tissue preincubated for 15 min. at 1 m*M* but not from tissue preincubated at 0.1 μM ACh.

75-2155. Lutz, H.; Lutz-Ostertag, Y. (Lab. Biol. Animale Complexe Sci. Cezeauz, Univ. Clermont, France). **The action of different pesticides on the development of bird embryos.** *Adv. Exp. Med. Biol.* 27: 127-150; 1972. (10 references)

The action of parathion, azinphos, aldrin, endosulfan, DDT, 2,4-D, and 2,4,5-T on the development of embryos in five species of birds was investigated. The bird species tested were quail eggs (*Coturnix coturnix japonica* T. and S.), chick eggs (*Gallus gallus* L.), pheasant (*Phasianus colchicus* L.), red legged partridge (*Alectoris rufa* L.), and gray partridge (*Perdrix perdrix* L.). All pesticides acted on the genital tract of the different species of birds. During embryonic development, significant modifications interfered with sexual differentiation. Histologically, there were three typical findings in males: sterility, reduced fertility, and intersexuality. In the females, the categories were sterile females, females with reduced fertility, and normal females. Of all pesticides tested at the doses prescribed by the manufacturer, only the organochlorinated compounds do not have a macroscopically evident effect on development, except for those abnormalities common to all pesticides. It is concluded that the pesticides tested do show deleterious effects on embryonic development, mainly on sexual differentiation. These results in bird embryos may be applicable also to mammalian embryos, since the placenta is not a barrier for these products.

75-2156. Fujita, T.; Kamoshita, K.*; Nishioka, T.; Nakajima, M. (Res. Dept., Pestic. Div., Sumitomo Chem. Co., Ltd., Hyogo, Japan). **Physicochemical parameters for structure-activity-studies of substituted phenyl *N*-methylcarbamates.** *Agr. Biol. Chem. (Tokyo)* 38(8): 1521-1528; 1974. (19 references)

The electronic and hydrophobic substituent parameters of a number of *o*-, *m*- and *p*-substituted phenyl N-methylcarbamates were estimated by measuring the alkaline catalyzed hydrolysis rate constant and 1-octanol/water partition coefficient. Since some *o*-substituted derivatives are very potent insecticides, emphasis was placed on determining the ortho substituent

effects in terms of the existing free-energy related parameters. The information obtained should be useful in structure-activity studies of carbamate insecticides. (Author abstract by permission)

75-2157. Ando, M.; Nakagawa, M.; Nakamura, T.; Tomita, K. (Sankyo Co. Ltd., Agric. Chem. Res. Lab., Tokyo, Japan). **Metabolism of isoxathion, *O,O*-diethyl *O*-(5 - phenyl-3-isoxazolyl) - phosphorothioate in the rat.** *Agric. Biol. Chem. (Tokyo)* 39(4): 803-809; 1975. (5 references)

Excretion, distribution and metabolism of the insecticide, Isoxathion, administered orally in male Wistar-strain rats, were investigated with a carbon-14 labeled chemical. During 96 hr, approximately 85% and 14% of the total radioactivity were excreted in the urine and feces. Distribution of isoxathion after oral administration in the rats was investigated by means of whole-body autoradiographic technique and measurement of radioactivity in the tissues. At least eleven radioactive metabolites were detected, four of which were structurally determined. They were 3-hydroxy-5-phenylisoxazole, 3-(β - D - glucopyranuronosyloxy) - 5 - phenylisoxazole, 5 - phenyl-3-isoxazolyl sulfate and hippuric acid. (Author abstract by permission)

75-2158. Krumzdorov, A. M. (Kuban Agricultural Institute, Krasnodar, USSR). **Prevrashchenie 2-metoksi-3,6-dikhlorbenzoynoy kisloty (dikamby) v rasteniyakh kukuruzy. [Transformation of 2-methoxy-3,6-dichlorobenzoic acid (dicamba) in corn plants.]** *Agrokhimiya* 7: 128-133; 1974. (22 references) (Russian)

The degradation and metabolism of dicamba in corn plants following application in the prescribed doses prior to or shortly before sowing were studied. Thin-layer chromatographic and photometric residue analyses revealed relatively rapid degradation of dicamba in corn plants starting on the first day. The degradation was completed in about 12 months. Dicamba metabolized, however, in 3,6-dichlorosalicylic acid, *para*-aminobenzoic acid, and benzoic acid, as well as another unidentified metabolite, which persisted in the plant material for 2 to 3 years. The metabolite levels in the plant materials increased with the progression of the vegetation period, and showed only slight reduction at harvesting.

75-2159. Koura, M.; Bell, D. R.; Gilles, H. M. (Dep. Trop. Med., Liverpool Sch. Med., Pembroke Place, Liverpool, England). **Lung shift effect of metrifonate (trichlorofone) in mice infected with *Schistosoma mansoni* in relation to the duration of infection.** *Ann. Trop. Med. Parasitol.* 68(3): 337-343; 1974. (19 references)

The therapeutic effect of metrifonate (trichlorfon) in albino mice infected with *S. mansoni* was investigated in relation to the duration of infection. Mice were treated with metrifonate in a dose of 100 mg/kg body weight daily for five days. Three groups of mice were used, infected for 10, 20, or 30 wk. No evidence of increased lung shift with increasing age of infection was found. In Group I (10 wk. old infections) 887, worms only eight of which were in the lungs, were recovered after treatment. In Group II (20 wk), seven out of a total of 568 were found in the lungs. In Group III (30 wk), only one of 397 worms was found in the lungs. The proportion of worms found in the lungs in the control (untreated) groups was 0.38% in Group I, 0.75% in Group II, and 0% in Group III. Metrifonate may be effective in human *S. mansoni* infections in the presence of portal hypertension with portal systemic shunts.

75-2160. Munnecke, D. M.; Hsieh, P. H. (Dep. Environ. Toxicol., Univ. California, Davis, CA 95616). **Microbial decontamination of parathion and *p*-nitrophenol in aqueous media.** *Appl. Microbiol.* 28(2): 212-217; 1974. (15 references)

A mixed microbial culture was adapted to growth on parathion to determine the feasibility of using microorganisms to detoxify concentrated parathion in agricultural wastes. In a 600-ml chemostat, the culture was able to degrade 50 mg of parathion per liter per hr. Paranitrophenol, produced by enzymatic hydrolysis of parathion, caused delays in exponential growth which were directly proportional to its concentration. A pseudomonad, isolated from the mixed culture, exhibited optimal growth at 0.21 m*M p*-nitrophenol and grew in concentrations up to 3.5 m*M*. In metabolic studies using [^{14}C]*p*-nitrophenol, the nitro goup was removed in stoichiometric quantities as nitrite and hydroquinone was tentatively identified as a metabolite. (Author abstract by permission)

75-2161. Engelhardt, G.; Wallnoefer, P. R.* (Bayerische Landesanstalt fuer Bodenkultur und Pflanzenbau, Munich, Germany). **Inhibition of phenylamide hydrolysis by *Bacillus sphaericus* with methylcarbamate and organophosphorus insecticides.** *Appl. Microbiol.* 29(6): 717-721; 1975. (23 references)

The degradation of the phenylamide herbicides monolinuron, linuron, and solan by cultures of *Bacillus sphaericus* ATTCC 12123 was inhibited by the methylcarbamate insecticides metmercapturon, aldicarb, propoxur, and carbaryl and by the organophosphorus insecticides fenthion and parathion. The extent of inhibition was largest with metmercapturon and smallest with parathion. Inhibition of hydrolysis of the two phenylurea herbicides was greater than of the acylanilide compound. Tests with crude enzyme preparations of aryl acylamidase derived from *B. sphaericus* showed that the inhibition of the hydrolysis of linuron with methylcarbamates is a competitive one. The insecticides tested did not induce the enzyme, nor could they serve as its substrate. (Author abstract by permission)

75-2162. Tichy, M.; Havrdova, J.; Cikrt, M. (Inst. Hyg. Epidemiol., Cent. Ind. Hyg. Occup. Dis., Srobarova,

Czechoslovakia). **Comments on the mechanism of excretion of mercury compounds via bile in rats.** *Arch. Toxicol.* 33(3): 267-271; 1975. (16 references)

While an inorganic mercury compound was excreted in rats via bile with substances of high molecular weight only (fraction 1), MeHg and PhHg compounds were excreted with substances of both high and low (fraction 2) molecular weights. The rate of enterohepatic circulation of the compounds increased and their total excretion from rats decreased with the relatively higher content of the compounds in fraction 2. The bile composition was found to be changed as a result of intoxication by organomercury compounds. (Author abstract by permission)

75-2163. Britton, W. M. (Dep. Poultry Sci., Univ. Georgia, Athens, GA 30602). **Toxicity of high dietary levels of DDT in laying hens.** *Bull. Environ. Contam. Toxicol.* 13(6): 703-706; 1975. (11 references)

The toxicity of high levels of dietary DDT in laying hens was studied. White leghorn hens were fed diets containing 0, 300, 600, and 1200 ppm technical grade DDT for three 28-day periods. The 1200 ppm diet caused tremors and 33% mortality in the final period, but no gross toxicity symptoms were seen in the birds fed the other diets. Egg production and egg weight were decreased during the third period by the 600 and 1200 ppm diets, egg weight also being decreased during the second period by the 1200 ppm diet. Shell thickness was decreased in all three periods by the 600 and 1200 ppm diets. Dietary DDT did not, however, cause any changes which could be detected by shell beta backscatter. Shell weight as a percent of the total egg weight was decreased by the 600 and 1200 ppm diets. The results indicate that laying hens can tolerate high dietary levels of DDT for a considerable period of time with no obvious ill effects.

75-2164. Mirer, F. E.; Cheever, K. L.; Murphy, S. D. (Dep. Physiol., Kresge Cent. Environmental Health, Harvard Univ., Sch. Pub. Health., Boston, MA 02115). **A comparison of gas chromatographic and anti-cholinesterase methods for measuring parathion metabolism in vitro.** *Bull. Environ. Contam. Toxicol.* 13(6): 745-750; 1975. (20 references)

The interchangeability of the gas chromatographic and anti-cholinesterase assays for the determination of paraoxon residues was tested by analyzing incubation mixtures of parathion with mouse liver homogenates using both methods. The livers were obtained from adult, male Charles River mice, some of which had been pretreated 1, 24, or 48 hr before sacrifice with piperonyl butoxide (400 mg/kg, i.p.). Both analytical methods showed a significant decrease in paraoxon production relative to control levels in the livers of animals sacrificed 1 hr after piperonyl butoxide treatment. Twenty-four hr after piperonyl butoxide treatment, there was an increase in paraoxon production, this increase becoming statistically significant after 48 hr. Similarly, parathion disappearance was significantly reduced in livers obtained 1 hr after treatment and significantly increased in livers obtained 24 hr after pretreatment. The results obtained using the gas chromatographic and anti-cholinesterase methods did not differ significantly. However, the limit of detection of paraoxon by the anti-cholinesterase method was 0.5 nm, while that with the gas chromatographic method was only 1.0 nm. In addition, the anti-cholinesterase method was more rapid and convenient, although the gas chromatographic method allowed measurement of the total amount of parathion metabolism in the same incubate.

75-2165. Gallenkamp, H.; Richter, E. (Med. Univ. Wuerzburg, Wuerzburg, Germany). **Influence of α-naphthylisothiocyanate (ANIT) on microsomal cytochrome P-450, protein and phospholipid content in rat liver.** *Biochem. Pharmacol.* 23(17): 2431-2435; 1974. (23 references)

In rats suffering from ANIT Induced cholestasis, plasma and microsomal phospholipid content was measured using lipid excretion, thin-layer chromatography and phosphorus determination. Microsomal protein and cytochrome P-450 content were also measured. Plasma phospholipids were found to be increased without similar changes within the liver. In ANIT-treated animals the hepatic microsomal protein content was increased whereas the microsomal phospholipid and cytochrome P-450 content remained unchanged. (Author abstract by permission)

75-2166. Taranova, N. P.; Dvorkin, V. Ya. (First Leningrad I. P. Pavlov Med. Inst., Leningrad, USSR). **Fosfolipidnyi sostav sinaptosom iz mozga krolikov v noṛme i pri intoksikatsii fosfororganicheskimi ingibitorami kholinesterazy. [Phospholipid composition of synaptosomes from rabbit brain in health and during intoxication with organophosphorus inhibitors of cholinesterase.]** *Biul. Eksp. Biol. Med.* 79(3): 39-41; 1975. (21 references) (Russian)

A study is presented of the quantitative and qualitative composition of phospholipids isolated by fractionation in the sucrose density gradient. Results showed that diacyl-aminophospholipid (APL) content of synaptosomes was lower than that of the brain homogenates. However, phosphatidylcholine, plasmologen APL and phosphoinositide content was greater in the synaptosomes. In the whole brain homogenate, strong excitation of the CNS induced with organophosphorus inhibitors produced a 25% decrease of diacyl APL content and a 17% rise in plasmalogen APL. There was no change in the phospholipid composition of synaptosomes.

75-2167. Newbold, C. (Toxic Chem. Wildlife Sect., Monks Wood Exp. Stn., Inst. Terrestrial Ecol., Huntingdon, England). **Herbicides in aquatic systems.** *Biol. Conserv.* 7(3): 97-118; 1975. (61 references)

The use of aquatic herbicides in Britain appears to be increasing. The ecological effects of these chemicals on aquatic ecosystems depend on the type of herbicide applied, the treatment level, and the frequency of application. Short-term effects could involve a reduction in oxygen, an increase in carbon dioxide, a lowering of the pH, an increase in bacterial populations, and a change in the nutrient status of the water and in plant communities; the result would be an alteration in the habitat of the aquatic fauna. Long-term ecological effects depend on the degree of habitat destruction, the persistence of the herbicide and its resulting effect on the suppression of renewed plant growth, and the suitability of any colonizing or nonsusceptible plant species in providing a habitat for the fauna. In this light, the characteristics of the herbicides diquat, paraquat, dichlobenil, chlorthiamid, terbutryn, dalapon, diuron, asulam, copper sulfate, maleic hydrazide, maleic hydrazide/2,4-D/chlorpropham, and 2,4-D amine are discussed.

75-2168. Miyata, T.; Saito, T. (Fac. Agric., Nagoya Univ., Nagoya, Japan). [**Metabolism of NS 2662 in the mouse.**] *Bochu Kagaku (Sci. Pest Control)* 38(2): 81-86; 1973. (12 references) (Japanese)

^{32}P-NS 2662 (O,O - dimethyl - 2,2 - dichloro - 1 - hydroxyethyl - phosphonate) was administered orally to mice to study the rate of excretion in the urine and feces and the metabolism in the whole body, brain, and liver. As a comparison, similar studies were also done using labelled DMVP, trichlorfon, and dichlorvos. When all four pesticides were given orally, about 70-80% of the applied dose was excreted from the mouse 12 hours after treatment. NS 2662 and trichlorfon were metabolized in the mouse more rapidly than in the American cockroach; biological half-lives were 90 minutes for NS 2662 and 80 minutes for trichlorfon. The main metabolites detected in the urine and body for all compounds were dimethyl phosphoric acid and phosphoric acid while desmethyl-dichlorvos and monomethyl phosphoric acid were also detected with trichlorfon. It is assumed that the rapid degradation and excretion of NS 2662 influence the low toxicity rate of mice with the main metabolic pathway being the cleavage of the P-C bond.

75-2169. Sikka, H. C.; Miyazaki, S.; Lynch, R. S. (Life Sci. Div., Syracuse Univ. Res. Corp., Syracuse, NY 13210). **Degradation of carbaryl and 1-naphthol by marine microorganisms.** *Bull. Environ. Contam. Toxicol.* 13(6): 666-672; 1975. (11 references)

Various species of bacteria (*Brevibacterium* sp., *Flavobacterium* sp., *Serratia marina*, and *Spirillum* sp.), yeasts (*Candida parapsilosis, Rhodotorula glutinis*, and *Trichosporon fermentans*), and filimentous fungi (*Aspergillus fumigatus, Culcitalna achraspora, Halosphaeria mediosetigera*, and *Humicola alopallonella*) were grown in medium containing 1.7 ppm of ^{14}C-carbaryl or 1.0 ppm of 1-naphthol. Carbaryl proved to be quite stable in growth medium maintained at pH 5.0-6.5, while 1-naphthol was relatively less stable to this pH range. All of the organisms studied, except *Brevibacterium, Flavobacterium*, and *Spi rillum*, were able to convert carbaryl to water-soluble products at pH 5.5. Culcitalna and Halosphaeria were the most efficient of the organisms studied in this respect. The organisms studied were not able to metabolize carbaryl to a significant extent. 1-Naphthol was more susceptible than carbaryl to degradation by these marine organisms. Degradation and metabolite production varied considerably from species to species. In general, the filamentous fungi appeared better able to degrade 1-naphthol than the yeasts or bacteria.

75-2170. Schafer, E. W.; Brunton, R. B.; Lockyer, N. F. (U.S. Fish Wildlife Serv., Wildlife Res. Cent., Denver, CO 80225). **The effects of subacute and chronic exposure to 4-aminopyridine on reproduction in Coturnix quail.** *Bull. Environ. Contam. Toxicol.* 13(6): 758-764; 1975. (5 references)

When male and female coturnix quail (*Coturnix coturnix*) were given a single subacute oral dose (5.62 mg/kg) of the avian frightening agent 4-aminopyridine (4AP) and paired with untreated mates, there was no effect on the reproductive performance of the males. Although the egg production of the females was reduced during the third week after treatment, recovery of normal production was evident during the fourth week. Chronic exposure to 31.6, 100, and 316 ppm of 4AP in the diet of mated pairs did not affect reproductive performance during or after the 4- or 6-week feeding period. No birds fed 1,000 ppm 4AP produced live chicks after treatment began and all these birds died within 3 weeks. The 28-day LC50 of 4AP was 447 ppm for male coturnix and 562 ppm for females. The F_1 progeny from the quail fed 31.6, 100, and 316 ppm 4AP and randomly mated at maturity showed no reproductive ill-effects.

75-2171. Majumdar, S. K.; Golia, J. (Dep. Biol., Lafayette Coll., Easton, PA). **Mutation test of 2,4,5-trichlorophenoxyacetic acid on *Drosophila melanogaster*.** *Can. J. Genet. Cytol.* 16(2): 465-466; 1974. (9 references)

The influence of 2,4,5-T on the frequency of sex-linked recessive lethals in *Drosophila melanogaster* was investigated. Oregon-R *D. melanogaster* males were fed medium containing 0, 250, or 1000 ppm 2,4,5-T then were mated with virgin *Basc* females in bottles containing regular food. The F_1 progeny from these crosses were allowed to intermate for 24 hr, after which males and females were paired and assorted into vials. Lethals were recorded in the F_2 generation. Control Oregon-R males produced about 0.05% sex-linked recessive lethals, while those fed 250 ppm 2,4,5-T produced 0.26% sex-linked recessive lethals and those fed 1000 ppm produced 0.66% X-linked lethals. The difference in mutation frequency was significant at the 1000-ppm level.

75-2172. Larsen, K. D.; Jalal, S. M. (Dep. Biol., Univ. North Dakota, Grand Forks, ND 58201). **DDT induced chromosome mutations in mice—further testing.** *Can. J. Genet. Cytol.* 16(3): 491-497; 1974. (23 references)

Brown and Balb/c albino mice were injected i.p. with 25, 50, 100, or 250 ppm DDT in peanut oil and killed 48 hr later; controls were not injected or were injected with the vehicle alone. Bone marrow smears were analyzed for chromosome gaps, deletions, and stickiness. The data for chromosome aberrations was obtained from 200 well-spread cells per animal and mitotic indices were calculated on the basis of 1000 cells per animal. Regression of aberrations on log DDT concentrations and Dunnett's multiple comparison test were used to determine the effect of the DDT treatments. Gaps, stickiness, and mitotic indices were not significantly affected by the DDT injections, but deletions and gaps plus deletions were significantly elevated by 50 ppm or more DDT. Thus, DDT appears to act as a mutagen in concentrations encountered naturally in many secondary consumers.

75-2173. Alam, M. T.; Kasitiya, S. S. (Service des Lab., Minist. des Affaires Sociales du Quebec, 560 Boul. Cartier, Ville de Laval, Quebec, Canada). **Chromosomal aberrations induced by an organic phosphate pesticide.** *Can. J. Genet. Cytol.* 16(3): 701; 1974.

The cytogenic effects of guthion (azinphosethyl) on Chinese hamster cells were studied. A dosage of 120 μg/ml induced an average breakage of 0.786 per cell compared to an average of 0.006 in controls. Common aberrations were chromatid breaks and exchanges; infrequent findings were mild failure of condensation, despiralization, secondary constriction, gaps, pulverization, ring and dicentric chromosomes. In relation to the relative length of chromosomes no. 1 and 2, there were no marked differences in the incidence of total breaks between them. However, there were significant differences in the non-random distribution of breaks. Generally, severe aberrations terminate in cells death. Results indicated that a viable mutant may be formed when a small segment is deleted, duplicated, translocated, or inverted.

75-2174. Long, J. W.; Siegel, M. R. (Dep. Plant Pathol., Univ. Kentucky, Lexington, KY 40506). **Mechanism of action and fate of the fungicide chlorothalonil (2,4,5,6-tetrachloroisophthalonitrile) in biological systems. 2. In vitro reactions.** *Chem.-Biol. Interactions* 10(6): 383-394; 1975. (29 references)

The reaction characteristics of chlorothalonil with glyceraldehyde-3-phosphate dehydrogenase (GPDH), derived from yeast, were studied in vitro. Enzyme inhibition was related to the amount of (^{14}C)chlorothalonil bound to the protein. The kinetics of enzyme inhibition were noncompetitive for the substrate glyceraldehyde-3-phosphate (GAP) (Ki = 0.42 μM). Reversal of enzyme inhibition was not seen with the low molecular thiol dithiothreitol (DTT), although the thiol did protect the protein against the toxic action of the fungicide. Because 5,5′-dithiobis-(2-nitrobenzoic) acid (DTNB) reduced the binding of labeled fungicide by approximately 90%, it is postulated that chlorothalonil affects catalytic activity by reacting with the 4 sulfhydryl series responsible for the binding of GAP. Certain reaction characteristics of the trichloromethyl sulfenyl fungicides with GPDH were similar to those of chlorothalonil, but chlorothalnoil differed from them in that it did not react with nonthiol groups of either GPDH or α-chymotrypsin and had a slower reaction rate with the GPDH. The differences in reaction rates of the fungicides appear to be due to the molecular size and chemical nature of the reactive toxiphores.

75-2175. Lucier, G. W.; Sonawane, B. R.; McDaniel, O. S.; Hook, G. E. R. (Natl. Inst. Environ. Health Sci., Natl. Inst. Health, Res. Triangle Park, NC 27709). **Postnatal stimulation of hepatic microsomal enzymes following administration of TCDD to pregnant rats.** *Chem.-Biol. Interactions* 11(1): 15-26; 1975. (33 references)

TCDD (3 μg/kg) was administered to pregnant Charles River rats as a single oral dose during early, middle, or late gestation. This treatment caused marked elevations in some maternal hepatic microsomal enzymes which persisted for at least 10 weeks. However, this dose level was not teratogenic and fetal rates of glucuronidation of testosterone and *p*-nitrophenol (PNP) were unaffected. Increases in fetal liver benzpyrene hydroxylase (BPH) were evident during late gestation although the cytochrome P-450 and cytochrome b_5 contents were unchanged. The offspring of the treated rats had markedly elevated PNP UDP-glucuronyltransferase (UDPGT) BPH and microsomal cytochrome levels, whereas the perinatal development of testosterone UDPGT was unchanged. PNP glucuronidation attained a maximal 8-fold increase above control levels by 3 weeks after birth, the activities being twice control levels within 8 weeks. Maximal increases in the benzpyrene hydroxylation rates occurred 1 day after birth, at which time the activities in the treated animals were approximately 20-fold higher than in the controls. Foster mother studies showed that the postnatal inductive effect resulted from exposure of the newborns to TCDD via the maternal milk and from the activation of an inducing mechanism which occurred after birth. This data demonstrates that multiple factors are responsible for the induction of hepatic microsomal enzymes in the newborn following the administration of TCDD to pregnant rats.

75-2176. Rose, M. S. (Author address not given). **The search for an effective treatment of paraquat poisoning.** *Chem. Ind. (London)* 10: 413-415; 1975.

The research program on the development of an effective treatment for paraquat poisoning carried out at the ICI Central Toxicology Laboratory is discussed. Emphasis was placed on factors which influence the absorption of paraquat from the gut, distribution in the body, excretion by the kidney, and mechanisms by which it

brings about the progression of reactions which lead to renal failure, lung congestion, and pulmonary failure. Paraquat is retained by the lung more than by any other organ in the first 24 hr following administration. No evidence could be found that paraquat would bind to homogenates of lung. When paraquat was administered orally to rats, the lung progressively accumulated paraquat to concentrations in excess of those of the plasma, but took 15 to 30 hr to reach levels known to be associated with lung damage. A fairly constant, albeit low, plasma concentration of paraquat was maintained in the lung. Clearance of plasma of paraquat is usually rapid indicating continuous absorption of paraquat from the gut into the plasma. If free paraquat is removed from the whole of the gastrointestinal tract, the plasma concentration is considerably reduced and the lung no longer accumulates enough paraquat to cause lethal damage.

75-2177. Mills, I. H. (Central Toxicol. Lab., Imperial Chem. Ind. Ltd., London, England). **Metabolic research.** *Chem. Ind. (London)* 10 (2): 418-419; 1975.

Metabolic studies are used to provide evidence of the absorption, distribution, excretion, and retention of a foreign compound and its metabolites in animals after single and chronic administration, by various routes. The determination and identification of biotransformation products in body fluids (urine, bile, and blood) indicate the compounds metabolic pathways. In vitro studies with tissue homogenates and sub-cellular fractions can be used to establish both the nature of the biotransformation processes and the actual drug-metabolizing enzymes involved, and are especially useful for metabolic research on food additives, industrial chemicals, and pesticides including diquat,,paraquat, pirimicarb, pirimiphos-methyl, and dimethirimol. Indeed, during chronic toxicity testing with pesticides, a comparison of the toxicological effects may be meaningless without specific metabolic data.

75-2178. Weisgerber, I.; Tomberg, W.; Klein W.; Korte, F. (Inst. fuer oekolgische Chemie, Gesellschaft fuer Strahlen-und Umweltforschung mbH, Munich, Germany). **Beitraege zur oekolgischen Chemie XCV. Isolierung und Strukturaufklaerung einiger hydrophiler Isodrin-14C-Metaboliten aus Weisskohl. [Contributions to Environmental Chemistry 95. Isolation and structural analysis of certain hydrophilic isodrin-14C metabolites from white cabbage.]** *Chemosphere* 4(2): 99-104; 1975. (8 references) (German)

Certain hydrophilic metabolites of ^{14}C-isodrin from white cabbage leaves were identified and structurally analyzed using combined gas-chromatography and mass spectrometry. Endrin and delta-keto-endrin, the chief metabolites, each accounted for 27% of the total radioactivity. In addition, three fractions of water-soluble metabolites were isolated. The least polar fraction was composed of several substances, which could not be identified. A second fraction included a metabolite with a molecular weight of 412, which accounted for 14% of the total radioactivity, and contained one carbon atom less than isodrin due to the rupture of the double bond. This fraction also contained another metabolite with a molecular weight of 426, accounting for 0.5% of the radioactivity. A third fraction contained a metabolite incorporating 1% of the radioactivity and with two carbon atoms less than the original compound. Another metabolite in this fraction, accounting for 1.4% of the radioactivity, was identified as prillic acid.

75-2179. Sugiura, K.; Sato, S.; Goto, M. (Dep. Chem., Gakushuin Univ., Tokyo, Japan). **Absorption-diffusion mechanism of BHC-residues—a consideration based on bacteria experiments as models.** *Chemosphere* 4(3): 189-194; 1975. (10 references)

The difference in absorption and residual amount of BHC isomers (alpha, beta, and gamma) was explained by an adsorption-diffusion mechanism using bacteria as a model. BHC at 0.0001, 0.01, 0.1 and 1 ppm was added to a salt solution used to cultivate five types of unidentified bacteria. The collected bacteria (living bacteria and bacteria killed by ultraviolet light) were suspended. Accumulated amounts of the isomers in the bacteria were determined each 0.8, 1.5, 3 and 24 hr. No differences occurred in the accumulation-equilibrium concentration of living and dead bacteria which shows that this is a passive process. The rate of accumulation depended upon the concentration and involved a two-stage accumulation process when the concentration was low(0.01 ppm). Determination of accumulated amounts of the isomers in bacteria showed that the time needed to achieve equilibrium was in the order of γ, α, and β-BHC.

75-2180. Gupta, A. K.; Singh, J. (Dep. Genet., Punjab Agric. Univ., Ludhiana, India). **Dichlorvos (DDVP) induced breaks in the salivary gland chromosomes of *Drosophila melanogaster*.** *Curr. Sci.* 43(20): 661-662; 1974. (8 references)

The possible mutagenic effects of dichlorvos were investigated in female *Drosophila melanogaster*. Seven different concentrations (50 ppm to 1 ppm) of commercial dichlorvos were prepared. One ml of solution at each concentration was mixed with 10 g of food in a vial; 15-20 flies were kept in each vial. Salivary gland chromosomes of fully grown larvae from these flies were examined from chromosomal aberrations. Even low concentrations of dichlorvos were highly toxic. No eggs were laid by the flies when dichlorvos was given in concentrations above 10 ppm. At concentrations lower than 10 ppm some egg laying was observed, but sufficient number of larvae could not be obtained. Even at 1 ppm concentrations, 45% survival was recorded, as compared with the controls. Ten percent of

all the cells studied at 1 ppm concentration showed chromosomal aberrations; no such abnormality was recorded in controls. Inversions were frequent and only one deletion was observed.

75-2181. Domir, S. C. (Virginia Polytech. Inst. and State Univ., Blacksburg, VA). **Absorption, movement and fate of ethephon as a maturing agent in flue-cured tobacco.** *Diss. Abstr. Int.* 35(12): 5727B; 1975.

The absorption, distributional pattern, and metabolic fate of ^{14}C ethephon in flue-cured tobacco were studied using autoradiography, thin-layer chromatography, high voltage paper electrophoresis, and liquid scintillation spectrometry. Labelled ethephon easily penetrated into mature tobacco leaf tissue and was translocated mostly acropetally. Only slight ^{14}C activity was detected four days later, indicating that ^{14}C ethephon was rapidly degraded by the leaf tissue. All of the ^{14}C-activity in methanol extracts was present in the form of a labeled compound with Rf value corresponding to that of ethephon, suggesting the absence of any detectable metabolites of the parent compound. Metabolic fate was investigated using a combination of techniques. The evolution of labelled ethylene increased with increasing buffer pH, buffer volume, and dosage of ^{14}C-ethephon. The rate of ^{14}C-ethylene evolution was maximum during the first day and leveled off on the fourth day. More than 50% of the total ^{14}C-ethylene evolved over 96 hr period was recovered during the first 24 hr after ^{14}C-ethephon application. No $^{14}CO_2$ was evolved when ^{14}C-ethephon was degraded in the presence of buffer or leaf discs. Only ethephon itself, and no detectable metabolites thereof, was discovered in the methanolic extract of the leaf disc tissue. An insignificant amount of ^{14}C-activity (approximately 2% of the extracted ^{14}C) was detected in the residue. By means of gas chromatogrpahy, it was confirmed that in buffers and tobacco leaf tissue ethephon breaks down to release ethylene but not CO_2. (Author abstract by permission, abridged. Copies of the thesis are available from University Microfilms, Order No. 75-11,939)

75-2182. Maglothin, J. A., Jr. (Univ. Colorado, Boulder, CO). **Phosphorylation of acetylcholinesterase and reactivation of the phosphorylated enzyme.** *Diss. Abstr. Int.* 35(12): 5794B-5795B; 1975.

The reaction of acetylcholinesterase with organophosphate triesters is a multistep process mechanistically analogous to the hydrolysis of the natural substrate. Greater understanding of the molecular events involved in the catalytic mechanisms is obtained by the comparison of the rate constants for the discrete steps of the phosphorylation reaction under conditions such that they appear unidirectional and by consideration of the equilibrium constants describing the process as a series of reversible reactions. Two classes of organophosphate inhibitors of acetylcholinesterase, phosphorothiolates and phosphates, are compared in terms of their reversible binding to the enzyme, phosphorylating activities and free energies of hydrolysis. By the treatment of phosphorylation as an intrinsically reversible process the equilibrium constants for the hydrolysis (ECH) of a series of diethyl phosphoryl hydroxyquinolines are determined. A linear free energy relationship for the logarithm of ECH versus the p*K*a of the leaving group is established for this series over the narrow range of p*K*a studied. The reaction of the enzyme with diphenyl phosphorochloridate is examined in detail. The reactions of the diphenyl phosphoryl enzyme are unusual since both spontaneous reactivation and aging are very rapid, but the inhibited enzyme is not reactivated by nucleophiles other than water. Both of the former reactions are shown to be accelerated to a small extent by substituted quaternary ammonium ions and to a much greater extent by low concentrations of organic solvents. Certain organic solvents likewise accelerate the spontaneous reactivation of the diethyl phosphoryl enzyme but inhibit reactivation by other nucleophiles. These observations are discussed in terms of various possible effects of the activators upon the enzyme catalytic process. (Author abstract by permission. Copies of the thesis are available from University Microfilms, Order No. 75-13,445)

75-2183. Anderson, M. D. (Howard Univ., Washington, DC). **The influence of male sterility by an α-chlorohydrin (3,chloro-1,2-propanediol), U-5897, and behavioral factors on fecundity of a rat colony.** *Diss. Abstr. Int.* 35(12): 6049B; 1975.

This study was undertaken to assess the ecological events that result, in a laboratory situation, from the administration of a chemosterilant to 85 percent of male rats in a population. The animals involved in the study were provided with food, water, space, and nest material *ad libitum* and in addition were also provided with a sophisticated environment. Data gathered included total counts of numbers of young, numbers of litters, measurements of overt male behavior, and surveys of male and female velocity in the control and experimental colonies. Study results showed a significant decrease in the total numbers and litters of young produced between control and experimental colonies. Study data also disclosed no significance with regard to libido exhibited by sterilized males when compared with libido of control males. Other important pertinents developing from the investigation include the establishment of a dose level of effectively sterilized males of the Osborne Mendel strain of *Rattus norvegicus;* affirmative evidence that the chemosterilant does not effect lesions in nervous tissue and that its action is on epididymal tissue exclusively; population dynamics as they are affected by the continual removal of young; and the impact of erratic female behavior patterns and concomitant impacts of overt male behavior patterns as profound provocators of decreased reproductive activities in confined populations. Chemosterilization when applied along with natural and artificial control mechanisms provides an ecologically acceptable means of controlling—not eliminating—populations of organisms

by insuring the absence of new individuals. Male chemosterilization as a sole means of effective population control, however, requires the application to many more individuals than 85% of the population before results can be determined as conclusive. (Author abstract by permission. Copies of the thesis are available from Univesity Microfilms, Order No. 75-2176)

75-2184. Laveglia, J.; Dahm, P. A. (Dep. Zool. Entomol., Iowa State Univ. Ames, IA 50010). **Influence of AC 92,100 (Counter) on microbial activities in three Iowa surface soils.** *Environ. Entomol.* 3(3): 528-533; 1974. (22 references)

Five laboratory tests were performed using 3 Iowa surface soils (Clarion, Harps, and Webster) to determine the influence of AC 92,000 (Counter), *0,0* - diethyl *S* - [(*tert* - butylthio)methyl] phosphorodithioate, on microbial activities. The insecticide was applied to 10-g soil samples at rates of 0, 1, 10, 50, and 100 ppm. The 1 ppm rate is equivalent to a field application rate of 1 lb/acre. Soil samples were incubated at 22±1°C for as long as 6 weeks and samples were removed for analyses at weekly intervals. Microbial activities in the 3 soils were measured by ammonium production, nitrification, carbon dioxide evolution, sulfur oxidation, and cellulose decomposition. There were 276 analytical mean values for soil samples receiving insecticide treatment. Of these, 48 values were significantly (P-0.05) higher than control values (0 insecticide treatment), 14 values were significantly lower than control values, and 214 values were not significantly different from control values. From the data presented it was concluded that AC 92,100 has no inhibitory influence on soil microbial activities. (Author abstract by permission)

75-2185. Isensee, A. R.; Jones, G. E. (Agric. Environ. Qual. Inst., Agric. Res. Cent., ARS, USDA, Beltsville, MD 20705). **Distribution of 2,3,7,8-tetrachlorodibenzo-*p*-dioxin (TCDD) in aquatic model ecosystem.** *Environ. Sci. Technol.* 668-672; 1975. (10 references)

Several organisms in a model ecosystem were exposed to ^{14}C-labeled TCDD for up to 31 days to determine the distribution and bioaccumulation potential in the aquatic environment. TCDD accumulation by all organisms were directly related to water concentration (0.05-1330 ppt) and averaged 2.0-2.6 × 10^4 (snail, *Gambusia*, and daphnid) and 4-9 × 10^3 (duckweed, algae, and catfish) times the water concentration. No metabolites of TCDD were found in submerged soil, water, snails, *Gambusia*, or catfish. (Author abstract reprinted by permission of the American Chemical Society)

75-2186. Gleyberman, S. E.; Volkova, A. P.; Nikolaev, G. M.; Zhukova, E. V. (All-Union Sci. Inst. Disinfection and Sterilization, Moscow, USSR). **Izuchenie embriotoksicheskikh svoystv repelenta dietiltoluamida. [A study on embryotoxic properties of the repellent diethyltoluamide.]** *Farmakol. Toksikol.* 2: 202-205; 1975. (6 references) (Russian)

The embryotoxicity of the repellent diethyltoluamide was studied in female albino rats. The preparation was applied on the bare skin in doses of 100 and 1,000 mg/kg (corresponding to 1/50 and 1/5 of LD50) daily during the entire pregnancy. Conception was similar in the test group and in the control, while the rate of implantation, showing a declining tendency in the group treated with 100 mg/kg doses, was significantly reduced in the 1,000 mg/kg group due to pre-implantational and post-implantational resorption. The overall embryonal mortality was 34.1% in the 1,000 mg/kg group, 27.6% in the 100 mg/kg group, and 20.9% in the control group. No teratogenic effect of the repellent was observed. The postnatal mortality was 27.4% in the 100 mg/kg group, 44.03% in the 1,000 mg/kg group, and 15.7% in the control. The mortality was highest during the first three days and between the 20th and 28th days of life. The newborn rats showed retarded development. Diethyltoluamide residues were detected in the ovaries, adrenals, and brains of females sacrificed on the 19th day of pregnancy. Residues were found in most organs even 3 months after the termination of the application. The preparation was found to penetrate through the placental barrier, and to accumulate in the fetus in the course of its intrauterine life. Further exposure after birth is due to the contamination of mothers' milk.

75-2187. Andrashko, V. V.; Levanyuk, V. F.; Kampo, M. A.; Gryzhak, I. P. (Mukachevo Branch, Lvov Sci. Res. Inst. Pediatrics, Obstetrics, and Gynecology, Mukachevo, USSR). **Vliyanie khlorofosa na energeticheskiy obmen v platsente i organakh vnutriutrobnogo ploda. [The effect of chlorophos on the energy metabolism in the placenta and organs of the intrauterine fetus.]** *Farmakol. Toksikol.* 2: 208-210; 1975. (15 references) (Russian)

The effect of trichlorfon on respiration in the placenta and fetal organs and tissues was studied in rabbits administered 50 or 75 mg/kg doses of this preparation daily through gastric tube starting from the second day of pregnancy. The animals were sacrificed on the 15th to 16th or 29th to 30th days of pregnancy. Trichlorfon had no visible effect on the source of the pregnancy, but a reduced number of embryos was observed on the 15th day of pregnancy with subsequent normalization relative to the control. Reduction of the respiration of the placental and fetal tissues was observed. This effect was most pronounced in the placenta on the 15th day (reduction by 64.4%), and the depression was most intense in the fetal liver on the 29th day. The disturbance in the oxidation processes may hinder the normal fetal development. The findings suggest a possible embryotoxic effect of trichlorfon following systematic and prolonged exposure.

75-2188. Sram, R. J.; Kocisova, J. (Inst. Hygiene Epidemiol., Prague, Czechoslovakia). **Effect of antibiotics on the mutagenic activity induced by chemicals. I. Chromosome aberrations during spermatogenesis in mice.** *Folia*

Biol. Acad. Sci. Bohemosl. 21(1): 60-64; 1975. (7 references)

The effect of various antibiotics on the frequency of TEPA-induced chromosomal abnormalities was studied by cytogenetic analysis in ICR-SPF mice during spermatogenesis. Male mice were injected i.p. with TEPA (1 mg/kg) and/or rifampicin (150 mg/kg), puromycin (100 mg/kg), chloramphenicol (500 mg/kg), or cycloheximide (100 mg/kg). Spermatocytes in the diakinesis/first metaphase stage of meiosis were evaluated regarding the frequency of multivalents and variations in the number of chromosomes. There was a nonsignificant increase in the frequency of translocations in the mice treated with TEPA plus chloramphenicol as compared with those treated with TEPA alone. In comparison with TEPA alone, TEPA plus chloramphenicol and TEPA plus cycloheximide increased the frequency of univalents in the categories 19II+U and 20II+f; these combinations also increased the frequency of abnormal spermatocytes. There was a decreased frequency of X and Y univalents in the animals treated with TEPA plus rifampicin and in those treated with TEPA and chloramphenicol. The results indicate a possible selective pressure against cells carrying some abnormalities.

75-2189. Boyadjiew, S.; Markov, S. (Med. Fac. I. P. Pavlov, Plovdiv, Bulgaria). **Some monosaccharide oximes as cholinesterase reactivators following the loading of white rats with parathion.** *Folia Med.* 16(4): 197-200; 1974. (3 references)

The action of glucosaminoxime hydrochloride, quaternary glucosaminoxime, glucosoxime, and galactosoxime as cholinesterase reactivators was investigated after single injections of 10 mg/kg parathion into white rats previously hyperdermally poisoned. The rats were divided into six groups with 7 rats in each group: parathion; parathion and glucosaminoxime (GAO); parathion, atropine, and GAO; parathion and dipiroxime; parathion, dipiroxime GAO; and control group. Glucosaminoxime and glucosoxime are weaker cholinesterase reactivators, following parathion poisoning, when compared to dipiroxime. Glucosoxime has a weaker effect than GAO. The quaternization of the nitrogen atom of the amino group does not increase considerably the reactivating power of the GAO.

75-2190. Nagasaki, H.; Kawabata, H.; Miyama, Y.; Inoue, K.; Hirao, K.; Aoe, H.; Ito, N. (Dep. Hyg., Nara Med. Univ., Nara, Japan). **Effect of various factors on induction of liver tumors in animals by the alpha-isomer of benzene hexachloride.** *Gann (Cancer)* 66(4): 185-191; 1975. (35 references)

The tumorigenic effect of a diet containing the α-isomer of BHC on the liver of various animals was examined. In one experiment, 20 male Wistar rats, 16 golden Syrian hamsters, and 36 DDY mice were given basal diet containing 500 ppm of α-BHC or basal diet alone for 24 wk. In the second experiment, 80 DDY, 88 ICR, 64 DBA/2, 88 C57BL/6, and 80 C3H/He mice were given basal diet containing 500 ppm of α-BHC or basal diet alone for 24 wk. In the third experiment, eight groups of 24 mice each received basal diet with the following additions: α-BHC; α - BHC plus *p* - hydroxypropiophenone; *p* - hydroxypropiophenone alone; α - BHC plus 3 - methylcholanthrene; 3 - methylcholanthrene alone; α - BHC plus 1 - naphthyl isothiocyanate; 1 - naphthyl isothiocyanate alone; basal diet alone. The compounds were added at the following levels to the basal diet: 500 ppm α - BHC, 1000 ppm *p* - hydroxypropiophenone, 67 ppm 3 - methylcholanthrene, and 600 ppm 1 - naphthyl isothiocyanate. α - BHC induced liver tumors in male and female mice but not in rats or hamsters. Histological changes in the livers of mice induced by α-BHC were also much greater than those induced in rats or hamsters. Male animals were more susceptible to the tumorigenic action of α-BHC than females. Among different strains of mice, the DDY showed greatest susceptibility and the C57BL/6 showed the least. Induction of mouse liver tumors by α - BHC was not inhibited by concomitant feeding of 1 - naphthyl isothiocyanate or *p* - hydroxypropiophenone. However, 3 - methylcholanthrene slightly inhibited their induction by α - BHC.

75-2191. Gurova, A. I.; Alekseeva, N. P.; Gorlova, O. E.; Chernyshova, R. A. (P. Lumumba Univ., Moscow, USSR). **K toksichnosti pestits dd antio otechestvennogo proizvodstva. [Toxicity of anthio, a pesticide produced in the Soviet Union.]** *Gig. Sanit.* 40(4): 110-111; 1975. (4 references) (Russian)

Results of complex toxicological investigations of anthio (formothion) are presented. Acute poisoning of albino mice and rats resulted in excitation, subsequent depression, disturbances of motor coordination, cyanosis, emesis, and reduction of the cholinesterase activity in the whole blood and in erythrocytes, with hepatic lesions. The LD50 was determined to be 400 mg/kg for albino mice, following resorption through the skin. The ratio of the percutaneous to oral toxicity was found to be 4.44. Repeated skin applications caused inflammation. The LC50 for albino mice was 27 mg/m^3, but concentrations up to 0.1 mg/l caused no mortality in rats. The threshold concentrations determined for albino mice and rats with respect to cholinesterase inhibition are 2.5 mg/m^3 and 5 mg/m^3, respectively. A final dose equaling 4.5 LD50 was not lethal in repeated oral administration of fractions of LD50. The maximum allowable anthio concentration in food products is set at 0.2 mg/kg, and at 0.032 mg/l in water. The maximum allowable concentration in the air is 0.015 mg/m^3, and the maximum daily average concentration is 0.004 mg/m^3. The workplace concentration of anthio should be lowered from 0.5 to 0.3 mg/m^3.

75-2192. Gorbachevskaya, E. F. (All-Union Sci. Res. Inst. Hyg. Toxicol. Pesticides, Polymers, and Plastics, Kiev, USSR). **Vliyanie DDT na antigennye svoystva nukleoproteidov pecheni zhivotnykh i ikh potomstva. [The ef-**

fects of DDT on the antigenic properties of nucleoproteins in the livers of anials and their offspring.] *Gig. Sanit.* 40(4): 111-113; 1975. (5 references) (Russian)

The effect of DDT on the antigenic properties of nucleoproteins in the liver was studied in female Chinchilla rabbits fed 10 mg/kg doses of DDT daily for 4 months before mating with intact males, and in their offspring. The antigenic properties of liver nucleoproteins in the adults and offspring were studied by sensitizing guinea pigs with liver nucleoproteins. The nucleoproteins of the liver in exposed adult rabbits and their offspring showed different antigenic properties than those of intact animals. The liver nucleoproteins of the offspring from experimental animals acquired anomalous properties as compared to control offspring. The development of anomalous autoantigenic properties indicates autoimmune processes in the animals treated with DDT and in their offspring.

75-2193. Borisenko, N. F. (Med. Inst., Kiev, USSR). **Izmenenie antigennoi struktury tkanevykh proteinov pod bliyaniem ptut'organicheskikh soedinenii. [Change in the antigenic structure of tissular proteins under the effect of organic mercury compounds.]** *Gig. Tr. Prof. Zabol.* 19(2): 31-35; 1975. (4 references) (Russian)

The antigenic structure of serum and tissular proteins of guinea pigs was analyzed by using anaphylaxis with desensitization, precipitation in gel, immunoelectrophoresis, and other methods after inhalation of phenylmercuric bromide (in concentrations of 0.03-0.07 mg/m³). Study indicated the appearance by the 7th day of additional antigens which remain definable during the whole observation period. Immunoelectrophoresis indicated an increase of antigenic components from 5-6 to 7-9 after 4 wks of experimentation. Extracts from other organs reveal no relation between the quantity of additional antigens and the time of the drug action. Immunochemical investigations of tissue antigens demonstrated the protein nature of the abnormal antigens, localized in the albumin and β-globulin zone.

75-2194. Chauhan, U. P. S.; Jaggi, C. B.; Rastogi, V. K. (Inst. Nucl. Med., All. Sci., Probyn Rd., Delhi-11007, India). **Hypertrophy of adrenals and ascorbic acid status in various tissues of malathion treated rats.** *Indian J. Med. Res.* 62(7): 987-989; 1974. (10 references)

The effect of acute malathion poisoning of adrenals and ascorbic acid status was investigated in various tissues of albino Sprague-Dawley rats. One group was administered malathion intraperitoneally (800 mg/kg body wt), and another group was used as control. The weight of the adrenal gland increased, and the cholesterol and ascorbic acid contents decreased in malathion-treated rats. Plasma, brain, and liver indicate a significant increase in ascorbic acid content; heart, spleen, and kidney did not change. It is inferred that malathion causes stress which stimulates pituitary function, increasing release of corticotropin and causing adrenal hyperactivity. Increased production of either pituitary corticotropin or adrenal corticosteroids or both might be responsible for increased content of ascorbic acid in plasma and other tissues.

75-2195. Darsie, J.; Holman, R. T. (Hormel Inst., Univ. Minnesota, Austin, MN 55912). **Effects of DDT upon fatty acyl desaturase and chain elongation activities of rat liver microsomes.** *J. Am. Oil Chem. Soc.* 51(7): 529A; 1974.

The effects of DDT upon fatty acyl desaturase and chain elongation activities of rat liver microsomes were investigated. The use of liver microsomes from male white rats fed a lab chow diet containing 5 ppm DDT resulted in a 25-50% reduction (compared to controls) in the hexadecanoic acid and PUFA desaturase and elongation activities. In vitro effects in untreated microsomes also were observed and correlated with the DDT residues found in the microsomal fraction. The implications of these findings are discussed in relation to pathological processes. (Abstract No. 168)

75-2196. Pitas, R. E.; Newton, R. G.; Jensen, R. G. (Dep. Nutr. Sci., Univ. Connecticut, Storrs, CT 06268). **Effect of parathion upon the in vitro protein kinase activation of rat adipose tissue lipase.** *J. Am. Oil Chem. Soc.* 51(7): 529A; 1974.

The effect of parathion on the in vitro protein kinase activation of rat adipose tissue lipase was investigated. Epididymal fat pads of red rats were homogenized in .25 *M* sucrose (1 m*M* EDTA) at 4°C and centrifuged at 105,000 × *g* for 45 min. The enzyme was precipitated from the supernate at pH 5.2 and concentrated by centrifugation. The precipitate was used as the enzyme source for determination of the effect of parathion upon the protein kinase activation of the enzyme. Parathion was added to the protein kinase activation system in graded levels with and without cyclic AMP or protein kinase and the enzyme activities were determined in an attempt to locate the site of inhibition of the pesticide. (Abstract No. 169)

75-2197. Onley, J. H.; Giuffrida, L.; Watts, R. R.; Ives, N. F.; Storherr, R. W. (Regist. Div., Environ Protect. Agency, Washington, DC 20460). **Residues in broiler chick tissues from low level feedings of seven chlorinated hydrocarbon insecticides.** *J. Assoc. Off. Anal. Chem.* 58(4): 785-792; 1975. (20 references)

Two chlorinated insecticide feeding studies from 1967-1968, using broiler chicks, have been completed. In Study I, lindane, heptachlor epoxide, dieldrin, endrin, methoxychlor, and DDT were fed in combination at 3 levels: 0.05, 0.15, and 0.45 ppm. Data shows that, in fat tissues, heptachlor epoxide attained a level approximately 20 times the respective levels in the feed; dieldrin 15 times; endrin 10 times; *p,p'*-DDT 9 times; lindane 3 times; and *o,p'*-DDT less than the feeding levels. Of the DDT metabolites, *p,p'*-DDE and *p,p'*-DDD, only *p,p'*-DDE was significant at 3 times the 0.45 ppm feeding level. Endrin

ketone, a metabolite of endrin, reached plateau levels approximately equal to feeding levels. All residue levels in liver tissues were <0.02 ppm. In Study II, technical chlordane was fed singly at the 0.05, 0.15, and 0.45 ppm levels. Results are tabulated for both total chlordane and for 6 identifiable isomers. Total chlordane in fat tissues attained plateau levels 3-5 times the respective feeding levels. Total chlordane levels in liver and breast tissues were all <0.01 ppm. (Author abstract by permission)

75-2198. Marking, L. L. (Fish Control Lab., La Crosse, WI 54601). **Effects of pH on toxicity of antimycin to fish.** *J. Fish. Res. Board Can.* 32(6): 769-773; 1975. (13 references)

Detoxification of antimycin at pH 9.5 was caused by two factors. The piscicide was biologically unavailable at the high pH, and this unavailability was reversed by decreasing the pH of water solutions. Simultaneously antimycin detoxified with time, and the resulting loss in toxicity was irreversible. The toxicity of antimycin was related to the amount of un-ionized molecules; however, the dissociation curve resulting from the published p*K*a of 5.1 does not agree with the implied dissociation when based on toxicity. Toxicity of antimycin decreased gradually from pH 6.5 to 8.5 and abruptly from 8.5 to 9.5 with carp (*Cyrinus carpio*), green sunfish (*Lepomis cyanellus*), and bluegill (*Lepomis macrochirus*). As previously suggested, water hardness had little or no effect on toxicity. (Author abstract by permission)

75-2199. McNicholl, P. G.; Mackay, W. C. (Dep. Zool., Univ. Alberta, Edmonton, Alberta, Canada). **Effect of DDT on discriminating ability of rainbow trout (*Salmo gairdneri*).** *J. Fish. Res. Board Can.* 32(6): 785-788; 1975. (19 references)

Rainbow trout (*Salmo gairdneri*) trained to discriminate between a bright (723 lx) and a dim (22 lx) light were tested to determine the minimum difference in light intensity they could distinguish before and 71 h after being given DDT orally at 0, 30, 50, and 80% of the LD50 dose. Discriminating ability decreased linearly with increased dose, while performance and retention were unaffected. (Author abstract by permission)

75-2200. Adams, M.; Coon, F. B.; Poling, C. E. (Nutr. Inst., Agric. Res. Serv., Beltsville, MD 20705). **Fatty acids in the tissues of four generations of male and female rats fed several food fats with and without added chlorinated hydrocarbon insecticides.** *J. Food Sci.* 40(4): 872-878; 1975. (27 references)

Male and female rats were fed diets containing various fats and chlorinated hydrocarbon insecticides to determine the effects on fatty acid composition of tissue lipids. In all cases the fat provided 20% of the diet by weight and 38% of the calories. Chlorinated hydrocarbons at levels 200 times those found in diets in the U.S. did not influence fatty acid contents in the tissues of four generations of rats regardless of diet, sex, or generation. This may be due to the relatively low DDT level or to the mixture of insectides used. In most respects, the fatty acid compositions of the carcasses of weanlings and of adult depot fat were similar. The concentration of oleic and linoleic acids in the tissues consistently reflected dietary intake, whereas stearic acid levels in the livers were similar regardless of the concentrations of this fatty acid in the diet. Although the results for rats fed heated fats follow a pattern similar in many respects to that observed with other fats, differences in the composition of the livers of males and females tend to be reduced or eliminated.

75-2201. Walter, R. H.; Bourke, J. B.; Sherman, R. M.; Clark, R. G.; Smith, S. E.; Lake, G. B. (Dep. Food Sci. Technol., New York State Agric. Exp. Stn., Cornell Univ., Geneva, NY 14456). **Status of DDT in milk from cows fed apple pomace.** *J. Milk Food Technol.* 38(6): 327-328; 1975. (6 references)

The effect on milk of current levels of DDT was investigated in commercial, dried apple pomace containing 0.12 ± 0.08 ppm DDT. Two groups of five dairy cows were fed an identical ration, with the exception of a 10% substitution of dried apple pomace containing 0.06 ppm DDT for corn. Milk samples were collected periodically for 15 weeks, and composite samples for each group were analyzed for milkfat and DDT. There was no significant difference between values in milk from the pomace fed cows and control cows. The residue in milk from pomace fed cows (0.061 ppm) was less than that which was found in commercial milk. At a 10% substitution level, the contribution of pomace to the total DDT intake was 0.0064 ppm of concentrate. Corn, at 50% of the concentrate, contributed 0.0055 ppm, and at a 6:4 ratio of roughage to concentrate, hay silage contributed 0.020 ppm. Resuming the feeding of apple pomace to dairy cows at a level of 10% of the concentrate should be a safe practice, barring extraneous contamination with DDT and other residues.

75-2202. Dross, K. (Inst. Klin. Pharmakol., Freie Univ. Berlin, Duesseldorf, Germany). **Effects of di-isopropylfluorophosphate on the metabolism of choline and phosphatidylcholine in rat brain.** *J. Neurochem.* 24(1): 701-706; 1975. (31 references)

The effects of DFP on the metabolism of choline and phosphatidylcholine were investigated in brain of adult female Wistar rats. A subcutaneous injection of 2.0 mg DFP/kg lowered the lysophosphatidylcholine content in the brain, decreased glycerylphosphorylcholine concentration, and reduced post mortem choline increase. The effects of DFP on choline phospholipids do not seem due to changes in activity of this enzyme since the concentrations of both lysolecithin and glycerylphosphorylcholine (sn-glycerol 3-phosphorylcholine) alter in parallel. Increase of substrate (phosphatidylcholine) and simultaneous decrease of product (lysophosphatidylcholine) points to the inhibition of phospholipase A.

75-2203. Binenfeld, Z. (Industrial Foundation for Plant Protection and Plastics, Zagreb, Yugoslavia). **Toxikoloska ispitivanja pesticida radi zastite okolisa. [Toxicological investigation of pesticides as an environmental protection measure.]** *Kem. Ind.* 7: 353-355; 1973. (6 references) (Serbo-Croatian)

Testing standards for the determination of acute, subacute, chronic, and specific toxicity of pesticides are discussed in relation to their effect on lab animals, farm animals, birds, fish, insects, and wild animals. Some of the U.S. standards are quoted: "high" toxicity is indicated when the LD50 of DDT in rats is less than 50 mg/kg per os, 2 mg per liter when inhaled, and 200 mg/kg percutaneous. The "medium" toxicity values are 50-500, 2-5, and 200-2000, respectively. A subacute toxicity figure is given for birds: 500 ppm over an 8-day period; also for fish: less than 0.1 ppm in 4 days.

75-2204. Akopyan, E. A.; Avakyan, B. P.; Kalantarov, A. A. (Armenian Sci. Res. Inst. Viticulture, Enology and Fruit-Growing, Armenian Sci. Res. Inst. Plant Protection, USSR). **Vliyanie dalapona na pochvennuyu mikrofloru vinogradnikov na Araratskoy ravnine. [Effect of dalapon on soil microflora of vineyards on the Ararat plain.]** *Khim. Sel. Khoz.* 12(7): 58-59; 1974. (5 references) (Russian)

The effect of dalapon on the soil microflora was studied in vineyards on the Ararat plain. Dalapon applied at an expenditure of 20 kg/ha reduced the total quantity of microorganisms growing on meat-peptone agar and of fungi during the first days after application; normalization followed in one month. Dalapon increased the populations of sporiferous bacteria, actinomycetes, cellulolytic bacteria, and nitrifying bacteria. The soil nitrate content increased for over 30 days. Dalapon inhibited fungi and aerobic cellulolytic microorganisms in certain soils.

75-2205. Kossakowski, S. (ul. Partyzantow 10, Pulawy, Poland). **Mechanizm dzialania pestycydow fosforoorganicznych na organizm zwierzecy. I. Unieczynnianie cholinesteraz w zatruciach pestycydami fosforoorganicznymi. [Mechanism of action of organophosphorus pesticides in animals. I. Inactivation of cholinesterase in intoxications with organophosphorus pesticides.]** *Med. Weter.* 30(7): 400-403; 1974. (Polish)

The molecular structure of different cholinesterases and their interaction with acetylcholine (ACh) is affected by organophosphorus compounds. The active sites of ChE each contain two parts: the anionic (which determines specificity) and the esteratic (which determines hydrolytic function). Organophosphorus pesticides and poisons inhibit Che by attaching to the esteratic part. The phosphor-containing part of the compound combines with the esteratic part of the enzyme causing its phosphorylation, blocks it and inactivates it. The inactivation of ChE progresses in two phases. The first is a bimolecular reaction during which a reversible dissociating complex is formed; the second is a mono-molecular change of an unstable complex into a stable one. Inactivation of ChE by organophosphorus compounds is a slow process. The enzyme-inhibitor complex resulting from phosphorylation dissociates very slowly and for all practical purposes the reaction is irreversible. The principal difference between the interaction of ACh with ChE and the interaction of organophosphorous pesticides with ChE is the slow reverse-dephosphorylation reaction. In addition to its ChE inactivating action, organophosphorous compounds can act directly on tissues as for instance through demyelinization of peripheral nerve fibers. A significant role is also ascribed to the metabolic effects which lead to "cellular biochemical shock".

75-2206. Kur, D. A. (Uzbek Sci. Res. Inst. Sanit., Hyg., and Occup. Diseases, USSR). **Biologicheskoe deystvie fosforganicheskikh pestitsidov v zavisimosti ot khimicheskoy struktury. [Biological action of organophosphorus pesticides as a function of their chemical structures.]** *Med. Zh. Uzb.* 2: 3-6; 1974. (Russian)

Acute and subacute toxicity of anthio (formothion) mercaptophos, and butyphos were studied in albino rats and rabbits to establish relationships between the biological action and chemical structure of organophosphorous pesticides. The inhibition of the cholinesterase activity in acute experiments was most pronounced in the erythroyctes, and weaker in the whole blood. The rate of inhibition was dose-dependent. In 20-day subacute experiments, considerable inhibition of the cholinesterase activity in the serum, liver, and brain, and changes in the serum protein fractions with significant increase of the γ- and β-globulins, and reduction of the albumin fractions were observed. All three pesticides reduced the tissue respiration and the cytochrome oxidase activity in the kidney. The oral LD50 of methylmercaptophos, anthio, and butyphos in rats were determined to be 192, 332, and 228 mg/kg, respectively. Thio- and dithiophosphoric acid derivatives with phosphorus bound to dimethyloxy groups were found to be less toxic than preparations in which phosphorus is bound to diethyloxy groups. The toxicity and insecticidal efficiency of organophosphorus preparations decrease with increasing number of carbon atoms in the alkyl group. Preparations in which phosphorus is bound to oxygen are more toxic than those with phosphorus-sulfur bonds. Thiol derivatives are more toxic than thione derivatives. The cholinesterase-inhibiting effect intensifies with increasing toxicity. Methylmercaptophos is a more powerful cholinesterase inhibitor than anthio, which may be due to the presence of carbamoylmethyl in the latter.

75-2207. Hanna, P. J.; Dyer, K. F. (State Coll. Victoria, North Geelong, Victoria, Australia). **Mutagenicity of organophosphorus compounds in bacteria and *Drosophila*.** *Mutat. Res.* 28(3): 405-420; 1975. (56 references)

40 Organophosphorus compounds (OPs) have been tested for mutagenic activity in bacteria, principally by

using two specially constructed sets of tester strains of the bacteria *Salmonella typhimurium* and *Escherichia coli*. It was found that 20% gave positive mutagenic responses and that this group of chemicals produce base substitutions rather than frame-shift mutations. In most cases the DNA repair genes *exrAt* and *recAt* were required for mutagenic activity. Seven compounds were further tested in *Drosophila melanogaster* for the ability to induce recessive lethal mutations. In some of these cases the doses administered to the flies had to be very low due to the highly toxic nature of the compounds. To over come this problem, the accumulation of recessive lethal mutations was measured in populations which were continually exposed to the compounds over a period of some 18 months. During this time the populations developed increased resistance to the compound and so the dose administered could gradually be increased. Six of the compounds were mutagenic. Of the compounds tested in both systems, those showing mutagenic activity in bacteria were also mutagenic in Drosophila, those not mutagenic in bacteria were not mutagenic in Drosophila. (Author abstract by permission)

75-2208. Nakamura, Y. (First Sch. Internal Med., Fac. Med., Nagoya Municipal Univ., Nagoya, Aichi, Japan). [**Experimental analyses of various factors on induction of liver tumors in rodents by α-BHC.**] *Nagoya Shiritsu Daigaku Igakkai Zasshi (J. Nagoya City Univ. Med. Assoc.)* 25(4): 418-429; 1975. (43 references) (Japanese)

Wistar male rats, Golden Syrian hamsters, and ddy male mice were fed a diet containing 500 ppm of α-BHC daily for 24 weeks. Induction of liver tumor was clearly recognized in mice; however, tumorigenic change was not observed in rats and hamsters. Histogical susceptibility to the liver-tumorigenic action of α-BHC decreased in the order mouse, rat, and hamster. Hepatic nodal hypertrophy was seen in all twenty mice administered α-BHC and induction of hepatocellular carcinoma was seen in six. Morbidity of liver tumor was highest in ddy strain and lowest in C37BL6 strain mice. Male mice were more susceptible to the tumorigenic action of α-BHC than females; no interstrain difference of histological manifestion was seen; however, in the ddy-strain many hepato-tumoral cells showed atypia with conspicuous swelling of liver parenchymatous cells outside tumors. Administration of hepatocellular cytostatic agents with α-BHC did not show any effect in histological manifestation of liver tumor. In the group administered α-BHC and 3-methylcholanthrene, smaller numbers of liver cells swelled with rare appearance of proliferation of bile ducts and oval cells, showing inhibitory action. In the group administered α-BHC and α-naphthyl isocyanate, conspicuous swelling of liver cells was observed as well as noticeable proliferation of bile ducts and the appearance of many oval cells.

75-2209. Engst, R.; Macholz, R. M.; Kujawa, M. (Zentralinst. Ernaehrung, Bergholz-Rehbruecke, DDR). **Metabolismus des Lindan. Abbau von Lindan durch Schimmelpilzkulturen. Unkonjugierte Metabolite.** [**Lindane metabolism. Degradation of lindane by mold cultures. Unconjugated metabolites.**] *Nahrung* 18(8): 737-745; 1974. (42 references) (German)

A lindane-degrading mold was isolated, cultivated, and used for lindane metabolism studies. Degradation products were identified by gas chromatography using various column packings and temperatures. The presence of pentachlorocyclohexene, the short-lived main metabolite, was proved by thin layer chromatography. In addition, signficant amounts of the following compounds were found: pentachlorobenzene, 2,3,4,6-tetrachlorophenol, 1,2,3,4-tetrachlorobenzene, 1,2,3-trichlorobenzene, 1,2,4-trichlorobenzene, 2,4,6-trichlorophenol, and 1,2-dichlorobenzene. Smaller amounts were found of: 1,3,5-trichlorobenzene, 1,2,4,5-tetrachlorobenzene, 2,3,4-trichlorophenol, 2,3,4,5-tetrachlorophenol, and pentachlorophenol. Hexachlorobenzene and 1,4-dichlorobenzene were identified as lindane degradation products.

75-2210. Thomas, J. A. (West Virginia Univ. Med. Cent., Dep. Pharmacol., Morgantown, WV 26506). **Actions of pesticides and other drugs on the male reproductive system.** *Natl. Tech. Inform. Serv.* PB 237 381, 1974, 41 p. (37 references)

DDT or dieldrin or 2,4,5-T administered to male mice caused significant reductions in the assimilation of androgens by sex accessory organs. DDT or dieldrin altered the metabolism of testosterone in the prostate gland and in the liver. DDT-^{3}H administration led to the detection of significant amounts of tritium in male reproductive organs. Unlike the organochlorine-type pesticides, neither carbaryl nor parathion administration altered androgen metabolism. The administration of carbaryl-^{14}C led to detectable amounts of radioactivity in several organs of reproduction including the seminal vesicles, prostate gland, and testes. The fungicides thiophanate and thiophanate-methyl had no effect upon spermatogenesis or upon the metabolism of androgens. (Abstract by permission)

75-2211. Metcalf, R. L.; Reinbold, K. A.; Sanborn, J. R.; Childers, W. F.; Bruce, W. N.; Coats, J. (Illinois Water Resources Cent., Illionis Univ. Urbana, IL). **Comparative biochemistry, biodegradability, and toxicity of DDT and carbofuran analogues.** *Natl. Tech. Inform. Serv.* PB 239 252, 1974, 51 p. (19 references)

The aquatic persistence, toxicity, and biodegradability of DDT, methoxychlor, and 28 analogues were evaluated using the green sunfish *Lepomis cyanellus*. Study of DDT analogues with degradophores located in aryl or alkyl moieties of the DDT-type molecule showed that the toxicity to and persistence of these compounds in the green sunfish is correlated with the environmental temperature of exposure and ability of multi-function oxidase enzymes of the fish to attack specific chemical

groupings on various parts of the molecule. The green sunfish can readily oxidize alkyl and methylthio groups of the aryl portion of the molecule to water partitioning moieties but alkoxy groups are not as readily attacked. Persistent and highly insecticidal DDT molecules can be developed which have greatly reduced toxicity to fish. The biochemical role of the multi-function oxidase enzymes in biodegradation of pesticides in the green sunfish was explored in detail using the oxidase inhibitor piperonyl butoxide together with radiolabeled methoxychlor, aldrin, and trifluralin. The reactions which were inhibited were *O*-demethylation, *N*-dealkylation, and epoxidation. Where piperonyl butoxide was present, the fish accumulated from 15 to 45 times more of the parent compound over a 16-day period. (Author abstract by permission)

75-2212. Guthrie, R. K.; Ferebee, R. N.; Cherry, D. S. (Dep. Microbiol., Clemson Univ., Clemson, SC). **Biologic detection of water pollution.** *Natl. Tech. Inform. Serv.* PB 239 412, 1974, 46 p. (13 references)

Dissolved oxygen, temperature, and natural bacterial populations were determined in four systems at monthly intervals in terms of total plate counts, nutritional types, proportion of chromagenic bacteria, and number of colony types for a period of one or two years, and data was analyzed on a seasonal basis. The effects of thermal addition and chemical addition (herbicide pollution) were studied in various systems. In Lake Hartwell, S.C., total bacterial counts showed that seasonal cycles occur; highest counts were observed in the warmer months. Bacterial diversity and percent chromagens varied with seasonal temperatures. No detectable seasonal cycle in total plate counts was observed in Lake Keowee; high and low counts occur randomly at various times during the year. In fast flowing aquatic systems at the Savannah River Project, seasonal cycles were observed in all systems; highest counts were detected during warmer months. Bacterial diversity and percent chromagens varied with temperatures. Of three herbicides tested, paraquat resulted in increased total populations, trichlorophenoxyacetic acid (2,4,5-T) did not significantly alter bacterial populations, and diuron resulted in significant decreases in total populations. Effects of thermal addition on bacterial populations varied according to the nature of the aquatic system, the generic composition present, and the degree of thermal addition in relation to ambient temperatures. (Author abstract by permission, edited)

75-2213. Sundstrom, G.; Jansson, B.; Jensen, S. (Natl. Swedish Environ. Protect. Board, Univ. Stockholm, Stockholm, Sweden). **Structure of phenolic metabolites of *p,p'*-DDE in rat, wild seal and guillemot.** *Nature (London)* 255(5510): 627-628; 1975. (12 references)

Rats were given *p,p'*-DDE (20 mg/animal dissolved in peanut oil) and the feces were investigated for the presence of phenolic metabolites. Seals and guillemots each excreted the same compounds as the rats. Structures of the 3 phenolic metabolites found are described. The structures were established by synthesis and subsequent comparisons using gas-liquid and thin layer chromatography and mass spectrometry of their methyl ethers. The metabolites corresponded to those found in wild seal and guillemot species. It is noted that these phenolic metabolites of the otherwise extensively studied compound, *p,p'*-DDE, have not been detected previously. The results of this study clearly indicate that even highly chlorinated compounds are slowly converted by mammals. It has been shown that the highly fat-soluble phenols thereby released are more toxic than the parent compounds. Thus, further knowledge of the fate of these phenols is of great importance.

75-2214. Rauws, A. G. (Lab. Pharmacol., Natl. Inst. Publ. Health, Bilthoven, Netherlands). **Thallium pharmacokinetics and its modification by Prussian Blue.** *Naunyn-Schmiedeberg's Arch. Pharmacol.* 284(3): 295-306; 1974. (17 references)

The pharmacokinetics of thallium in the rat were investigated with radioactive tracer techniques. The results were used to simulate thallium kinetics on an analog computer on the basis of a three-compartment open model. The half-life of thallium in the rat is approximately four days. Under pretreatment with Pussian Blue it is reduced to approximately two days. An intensive entero-enteral cycle is operative in the rat. The influence of Prussian Blue on thallium kinetics was studied. It is concluded from the results of the simulation that the entero-enteral cycle of thallium is not fully interrupted by Prussian Blue, but slowed down to a considerable extent. (Author abstract by permission)

75-2215. Schmidt, G.; Schmidt, M.; Nenner, M. (Dep. Pharmacol., Univ. Goettingen, Goettingen, Germany). **Inhibition of acetylcholinesterase in the bronchial system of rats caused by inhalation of dichlorvos (DDVP).** *Naunyn-Schmiedeberg's Arch. Pharmacol.* 287(Suppl.): R97; 1975.

The organophosphorus compound dichlorvos (*O,O*-dimethyl-2,2-dichlorovinyl phosphate) is intended to be used as an insecticide within enclosed rooms. Although the concentrations are sufficient for insecticidal action no danger for higher animals arises because DDVP is rapidly metabolized by the liver. Thus no decrease of acetylcholinesterase activity in the blood is observed during the usual application of dichlorvos resin strips (for example Vapona Strips). Nevertheless the question remains whether a local inhibition of acetylcholinesterase at the place of entry in the bronchial tissue might occur. Rats were exposed to various dichlorvos concentrations in the atmosphere. The acetylcholinesterase activity in bronchial homogenate was reduced to 63% of normal activity by 0.8 μg DDVP/l air and 51% by 1.8 μg DDVP/l air whereas no decrease of acetylcholinesterase activity in the blood was found within this range. Histochemical preparations of the mucous membrane of the trachea showed that the

typical AChE-activity of the bronchial glands was lost even at the very low concentration of 0.2 μg DDVP/1 air. (Author abstract by permission)

75-2216. Hoellt, V.; Mench, W.; Schenk, J.; Weger, N. (Fed. Armed Forces Med. Coll., Munich, Germany). **Binding of ^{3}H-diisopropylfluorophosphate (DFP) to purified human serum cholinesterase and to rat brain homogenate.** *Naunyn-Schmiedeberg's Arch. Pharmacol.* 287(Suppl.): R98; 1975.

Binding of tritiated DFP (10 Ci/mmole) to a commercially available preparation of purified human serum cholinesterase and to rat brain homogenate was measured by filtration through glass fiber filters after precipitation with acetone. In case of serum cholinesterase, the irreversible reaction shows a bimolecular rate constant of 4.3-53-1$10^7 M^{-1}$ min^{-1} at 25°C in sodium phosphate buffer (0.05 *M*; pH 7.4). Under these conditions, the number of binding sites is 220 nmoles per gram protein. As obtained from competition experiments the calculated bi molecular rate constants of soman, sarin, and tabun are in the order of $10^7 M^{-1}$ min^{-1}, whereas the constant of physostigmine is one order smaller. For our experimental conditions the concentrations of the following compounds which decrease by half the binding of DFP (association time = 30 min) were determined: gallamine 5×10^5 *M* d-tubocurarine $3 \times 10^3 M$, atropine $10^4 M$, and toxogonin $10^3 M$. In further experiments the interaction of DFP with diluted rat brain homogenate (1g wet weight per 100 ml sodium phosphate buffer pH 7.4) was investigated. The kinetics of the binding shows a progressive reaction producing a complex that is not reversible by adding high concentrations of unlabeled DFP. Whereas low concentrations of organophosphorus compounds decrease the rate of DFP binding, the effects of physostigmine, atropine, and toxogonin on the binding are small, even at high concentrations. (Author abstract by permission)

75-2217. Schenk, J.; Loeffler, W.; Weger, N. (Fed. Armed Forces Med. Coll., Munich, Germany). **Influence of the oximes HS-3 and HS-6 on soman poisoning in beagles.** *Naunyn-Schmiedeberg's Arch. Pharmacol.* 287(Suppl.): R98; 1975.

Investigations of bis-pyridinium-aldoximes HS-3 and HS-6 in combination with the cholinolytics atropine and benactycine against soman poisoning in male beagles were performed. These antidotes were applied i.m. in various combinations as well as doses of HS-3 (50 mg/kg), HS-6 (100 mg/kg), atropine sulfate and benactycine (2 mg/kg each) either within 6 minutes after s.c. intoxication, or at the beginning of convulsions. On the average, 28 min after intoxication the convulsions began strikingly with soman concentrations of 2.3-7.7 $\times 10^7$ mol/kg (corresponding to 3-10 LD50). The effect of antidotes was investigated on the basis of clinical symptoms (including EKG, the activities of enzymes CPK, GOT, and GPT in serum) as well as the rate of surviving after 8 days, and the change of activity of cholinesterase in serum. It was found that firstly, the most effective protection was attained if both oximes were early (6 min after intoxication) applied together with cholinolytics (protection index about 10 LD50); secondly, if HS-6 was given instead of HS-3, it proved a more intensive effect of protection (protection index about 5 LD50); and thirdly, if HS-3 was applied in combination with cholinolytics at the beginning of convulsions (generally 28 min after intoxication), it also showed an effect of protection (protection index about 5 LD50). The protection effect against soman was not linked with reactivation of the phosphonylated serum cholinesterase. The maximal blood levels for HS-3 and HS-6 were measured 20 to 30 min after i.m. injection. The half time values of HS-3 and HS-6 in plasma were 45 to 60 min. (Author abstract by permission)

75-2218. Portig, J.; Noack, G.; Sodomann, S. (Inst. Toxicol. Pharmacol., Marburg, Germany). **Glutathione-dependent biotransformation in rats of isomers of hexachlorocyclohexane.** *Naunyn-Schmiedeberg's Arch. Pharmacol.* 287(Suppl.): R99; 1975.

Rat liver supernatant has been shown (Portig et al., *Naunyn-Schmiedeberg's Arch. Pharmacol.* 279: 185; 1973) to slowly convert the α-isomer of hexachlorocyclohexane (HCH) to hydrophilic substance in a reaction that appears to be enzymic and requires the presence of glutathione. The product of the conversion has since been found to consist of at least three isomers of *S*-(dichlorophenyl)glutathione: 3,4-, 2,4-, and 2,5-. A mercapturic acid fraction prepared from the urine of rats given α-HCH yields, upon alkaline hydrolysis, the following isomers of dichlorothiophenol: 3,4->2,4->2,5->2,3->2,6-. An estimated 15-20% of the urinary metabolites produced by a rat in 4 weeks from a dose of α-HCH are dichlorophenylmercapturic acids, suggesting conjugation with glutathione to be a significant means for this species to dispose of α-HCH. The γ- and δ-isomers of HCH appear to be subject to transformation along the same pathway, though to a lesser extent than the α-isomer, 3,4->2,4-> 2,5- > 2,3- > 2,6- and 2,4- > 2,3- > 2,6- > 3,4-dichlorothiophenol were isolated from the urine of rats given γ- or δ-HCH, respectively. (Author abstract by permission)

75-2219. Noack, G.; Portig, J.; Wirsching, M. (Inst. Toxikol. Pharmacol., Philipps Univ., Marburg, Germany). **Biodegradation of α-hexachlorocyclohexane. IV. The extent of degradation of single doses in vivo.** *Naunyn-Schmiedeberg's Arch. Pharmacol.* 288(1): 57-64; 1975. (9 references)

Urine and stools were collected daily from 4 adult rats kept in single cages and injected once i.p. with α-hexachlorocyclohexane (α-BHC; dose per animal 126-150 μmoles), labelled uniformly with 14-C (10.8-14.0 $\times 10^6$ dpm per animal). In 4 weeks, 65% of the label was excreted through the kidney and 16% by way of the intestine, with

an estimated 8% being retained in depot fat. GLC-analysis of the pooled urine showed it to contain very little unchanged drug, on average, 0.05% of the dose. The time-course of the renal excretion of 14-C-labelled substance corresponded rather closely to the excretion of organically bound 36-Cl seen in earlier experiments with 36-Cl-labelled drug, indicating that the majority of urinary metabolites, presumably, still bear chlorine. All or nearly all of the fecal 14-C was found by GLC to be accounted for by the stool's content of unchanged α-HCH. Taken together, the results indicate a mean extent of α-HCH-degradation in the rat in the order of 80-85% of a dose. Two rats were given 400 mg/kg of "cold" α-HCH by mouth 4 days before i.p. application of 14-C-labelled drug and were found to excrete more label through the kidneys in the first week than did the non-pretreated rats. This indicates that the drug stimulates its own degradation. (Author abstract by permission)

75-2220. Koransky, W.; Muench, G.; Noack, G.; Portig, J.; Sodomann, S.; Wirsching, M. (Inst. Toxikol. Pharmakol., Phillips Univ., Marburg, Germany). **Biodegradation of α-hexachlorocyclohexane. V. Characterization of the major urinary metabolites.** *Naunyn-Schmiedeberg's Arch. Pharmacol.* 288(1): 65-78; 1975. (16 references)

Free 2,4,5- and 2,4,6-trichlorophenol (TCP) have been identified by co-crystallization with authentic carrier as constituents of the urine of rats given 3-H-labelled α-hexachlorocyclohexane (α-BHC). The two TCPs constituted 7% and 63%, respectively, of the free phenol fraction which was found to account for less than 5% of all urinary metabolites. 75% of the label contained in the urine of rats collected for four weeks after an i.p. dose of 14-C-α-HCH could be extracted into an organic solvent after alkaline and acid hydrolysis. The radioactive material thus extracted was examined by TLC and GLC. It is shown to consist mainly of chlorophenols and chlorothiophenols. The extracts' major constituent was 2,4,6-TCP. Its amount was determined by GLC and was found to account for, on average, 45% of the total urinary metabolites. In conjunction with other evidence, this is considered to establish 2,4,6-TCP as the major product of α-HCH-biodegradation in the rat. Chromatographic evidence is presented for 2,3,4,5-tetrachlorophenol and 2,4,5-TCP being other components of the chlorophenol fraction isolated from hydrolyzed urine. The amount of label associated with the chlorothiophenol fraction suggests a pathway involving endogenous thiol to be of significance in α-HCH-biodegradation in rats. Pretreatment with the drug itself increased the proportion of label associated with the fraction. (Author abstract by permission)

75-2221. Imai, H. (Dep. Ophthalmol., School of Medicine, Kitasato University, Sagamihara, Japan.) [**Toxicity of organophosphorous pesticides (fenthion) on the retina. Electroretinographic and biochemical study.**] *Nippon Ganka Gakkai Zasshi (J. Jpn. Ophthalmol. Soc.)* 78(4): 1-10; 1974. (21 references) (Japanese)

Fenthion was injected intramuscularly to Wistar rats to determine its toxicity to and its effect on the central nervous system using the eyes as indicators. Four days post-injection the ERG of the rats was recorded under pentobarbital anesthesia. At dose levels of less than 0.5 mg/kg, the main changes in the ERG were a shortening in the latency time of the alpha wave, a shortening in the peak times of the alpha and beta waves, and an increase in the amplitude of the waves. At dosage levels higher than 25 mg/kg latency times and peak times of the alpha and beta waves and the oscillatory potential were all significantly prolonged; amplitude of alpha and beta waves decreased. Retinal cholinesterase activity was almost twice as high as in the cerebellum of control animals. At doses greater than 0.5 mg/kg, a dose dependent decrease appeared in the AChE activity in the retina and cerebellum. When activity was greater than 50% of the control, a supernormal ERG was apparent; with less than 50% activity the ERG was subnormal. The dose effecting minimum changes in the ERG was 0.005 mg/kg; i.e., 1/60,000 of the lethal dose (LD50: 300 mg/kg). It was emphasized that chronic toxicity of a pesticide should be determined by considering nervous system symptoms rather than depending entirely on the LD50 value.

75-2222. Kiriyama, S.; Banjo, M.; Matsushima, H. (Dep. Agric. Chem., Fac. Agric., Ehime Univ., Matsuyama, Japan). **Effect of polychlorinated biphenyls (PCB) and related compounds on the weight of various organs and plasma and liver cholesterol in the rat.** *Nutr. Rep. Int.* 10(2): 79-88; 1974. (8 references)

The effect of polychlorinated biphenyls and related compounds (diphenyl, *o*-, *m*-, *p*-terphenyls, Kanetherm-T, Kanetherm-H and KSK oil) on the weight of various organs and plasma and liver cholesterol levels were examined in Wistar rats. The rats were fed test diets containing either polychlorinated biphenyl or various polychlorinated biphenyl substitutes at a 0.2% level (2000 ppm). *Ortho*-and *meta*-terphenyls significantly depressed body weight gain, and the latter also induced a significant liver hypertrophy, although the effects were less pronounced than those of polychlorinated biphenyls. The plasma cholesterol level was significantly increased by the feeding of polychlorinated biphenyls or either of the terphenyl isomers, but the increase of liver cholesterol was observed only in polychlorinated biphenyl fed groups. Kanetherm-T, Kanetherm-H and KSK oil did not increase plasma and liver cholesterol levels; the former decreased plasma cholesterol below that of the normal group, whereas all of these polychlorinated biphenyl substitutes caused significant depression in body weight gain and liver hypertrophy. It is assumed that the hypercholesterolemic action of polychlorinated biphenyls was derived from its diphenyl carbon skeleton and that the activity was related to the metabolic stability of these diphenyl derivatives in the rat body.

75-2223. Gerolt, P. (Shell Res., Ltd., Woodstock Lab., Sittingbourne Res. Cent., Kent, England). **Mechanism of resistance of dichlorvos in adult houseflies.** *Pestic. Biochem. Physiol.* 4(3): 275-288; 1974. (22 references)

Houseflies (*Musca domestica*) originating in agricultural buildings in Jalasjarvi in the Vaasa province of Finland were found to be resistant to contact with a variety of organophosphorus insecticides, including dichlorvos. Tolerance to topical application of bromophos, crotoxyphos, and trichlorfon was fairly high, but was only moderate to dimethoate and dichlorvos and was very low to tetrachlorvinphos. Much higher degrees of resistance were obtained after exposure to surface deposits. Evidence indicates that the mechanism of resistance in these flies is probably based on reduced penetration. With dichlorvos, less of the absorbed chemical penetrated the central nervous system (the thoracic ganglionic complex) of the resistant fly than penetrated that of the susceptible fly. There were no apparent differences between the strains in the otherwise small rates of degradation of dichlorvos.

75-2224. Wilkinson, C. F.; Hetnarski, K.; Hicks, L. J. (Dep. Entomol., Cornell Univ., Ithaca, NY 14850). **Substituted imidazoles as inhibitors of microsomal oxidation and insecticide synergists.** *Pestic. Biochem. Physiol.* 4(3): 299-312; 1974. (31 references)

The inhibitory activity of 47 1-, 2-, and 4(5)-substituted imidazoles on microsomal epoxidation, hydroxylation, and *N*-demethylation in rat liver and armyworm gut enzyme preparations was evaluated. Many of the 1- and 4(5)-substituted compounds were highly potent inhibitors of microsomal epoxidase and hydroxylase but were uniformly less active with regard to *N*-demethylation. The armyworm gut enzymes were, in general, more susceptible to inhibition than were those from rat liver. Inhibition followed either competitive or mixed type kinetics, depending on both the inhibitor and substrate involved. The imidazoles bound powerfully to cytochrome P-450 and yielded type I difference spectra in oxidized and NADPH-reduced microsomes. Since spectral dissociation constants (Ka) appeared to closely parallel the I50 values, the inhibitory activity of the imidazoles appears to result primarily from their capacity to bind cytochrome P-450 and closely related substrate binding sites. Several of the 1-arylimidazoles are potent in vivo synergists of carbaryl against NAIDM insecticide susceptible houseflies.

75-2225. Akkermans, L. M. A.; Van den Bercken, J.; Van der Zalm, J. M.; Van Straaten, H. W. M. (Inst. Vet. Pharmacol. Toxicol., Univ. Utrecht, Utrecht, The Netherlands). **Effects of dieldrin (HEOD) and some of its metabolites on synaptic transmission in the frog motor end-plate.** *Pestic. Biochem. Physiol.* 4(3): 313-324; 1974. (39 references)

Intracellular microelectrodes were used to study the effects of dieldrin and some of its metabolites on synaptic transmission in the frog motor end-plate. Dieldrin itself and the metabolites 9-*syn*-hydroxy-dieldrin and the aldrin-derived dicarboxylic acid had no significant effect on the frequency and amplitude of the miniature end-plate potentials, nor on end-plate membrane potential. However, aldrin-transdiol caused a rapid and marked increase in miniature end-plate potential frequency and a decrease in amplitude. The spontaneous transmitter release was probably enhanced by 2 prejunctional mechanisms: a calcium-dependent action,probably a depolarization of the nerve terminal; and a calcium-independent action. Aldrin-transdiol also reduced the amount of transmitter released in response to high external potassium concentrations, affected the evoked transmitter release, and caused a marked increase in end-plate potential amplitude, followed by a decrease and eventually a complete blockade of neuromuscular transmission. This transient increase in transmitter release was due to a transient increase in quantal content. The subsequent fall in end-plate potential amplitude and the fall in miniature end-plate potential amplitude probably resulted from a reduction in the sensitivity of the postsynaptic membrane to acetylcholine. Aldrin-transdiol had no effect on the end-plate membrane potential. The results strongly support the view that dieldrin must be converted to aldrin-transdiol before it can exert its neurotoxic action.

75-2226. Smith, B. R.; Dauterman, W. C.; Hodgson, E. (Dep. Entomol., North Carolina State Univ., Raleigh, NC 27607). **Selective inhibition of the metabolism of diazinon and diazoxon in vitro by piperonyl butoxide, NIA 16824, and 1-(2-isopropylphenyl)imidazole.** *Pestic. Biochem. Physiol.* 4(3): 337-345; 1974. (35 references)

Several pesticide synergists known to be mixed-function oxidase inhibitors were found to inhibit the in vitro metabolism of diazinon by mouse liver microsome preparation. Piperonyl butoxide and NIA 16824 inhibited all oxidative reactions of diazinon to the same extent, while 1-(2-isopropylphenyl)imidazole selectively inhibited oxidative dearylation and thiophosphate-to-phosphate conversion without significantly affecting ring side chain hydroxylation. This selectivity suggests that two different mechanisms of oxidative detoxification may be operating. These mechanisms may involve either two cytochrome P-450s or two different binding sites on the same cytochrome.

75-2227. Wustner, D. A.; Fukuto, T. R. (Dep. Entomol., Div. Toxicol. Physiol., Univ. California, Riverside, CA 92502). **Affinity and phosphonylation constants for the inhibition of cholinesterases by the optical isomers of *O*-2-butyl-*S*-2-(dimethylammonium)ethyl ethylphosphonothioate hydrogen oxalate.** *Pestic. Biochem. Physiol.* 4(3): 365-376; 1974. (26 references)

The 4 optical isomers of *O*-2-butyl-*S*-2-(dimethylammonium)ethyl ethylphosphonothioate having known absolute configurations were

synthesized via the condensation of the sodium salts of the isomeric phosphonothioic acids with 2-(dimethylamino)chloroethane in ethanol. Treatment with oxalic acid followed by recrystallization from acetone gave the final products. The chiral isomers and the racemic mixture were analyzed for their affinity constants (*K*a), phosphonylation constants (*k*p), and bimolecular inhibition rate constants (*k*i) for the inhibition of bovine erythrocyte acetylcholinesterase, housefly-head acetylcholinesterase, and horse serum cholinesterase. Using a relatively simple spectrophotometric technique, inhibition times as low as 0.5 sec were used. The phosphorus isomers of *S*p configuration were more potent inhibitors than their *R*p enantiomers by a factor of 1630 against the bovine enzyme, a factor of 9120 against the fly-head enzyme, and a factor of 40 against the horse serum enzyme. The differences in anticholinesterase activity were attributable to differences in the *K*a and *k*p. Small but consistent inhibition rate differences were attributable to asymmetry at the 2-butyl carbon. Against the horse serum cholinesterase, the *S*c isomers showed the presence of 3 kinetic forms in this enzyme preparation.

75-2228. Priest, B.; Stephens, R. J. (Sch. Biol. Sci., Univ. Bath, Claverton Down, Bath, England). **Studies on the breakdown of *p*-chlorophenyl methylcarbamate. I. In soil.** *Pestic. Sci.* 6(1): 53-59; 1975. (13 references)

The compound *p*-chlorophenyl methylcarbamate (PCMC) was shown to inhibit the breakdown of the herbicide isopropyl 3-chlorophenylcarbamate (chlorpropham) in soil, increasing its half-life from 7.5 to 20 days. The inhibitory effect of PCMC on the breakdown of chlorpropham persisted for 40 days, with a half-life of 20 days. The conversion of PCMC to *p*-chlorophenol, a compound which did not affect the persistence of chlorpropham, was demonstrated in soil, and it is suggested that spontaneous chemical hydrolysis may account for this conversion. PCMC and *p*-chlorophenol were shown to be of low toxicity to buckwheat (*Fagopyrum esculentum* Moensch.). (Author abstract by permission)

75-2229. Westmacott, D.; Wright, S. J. L. (Dep. Biol. Sci., Univ. Warwick, Coventry, England). **Studies on the breakdown of *p*-chlorophenyl methylcarbamate. II. In cultures of a soil *Arthrobacter* sp.** *Pestic. Sci.* 6(1): 61-68; 1975. (29 references)

p-Chlorophenyl methylcarbamate (PCMC) underwent spontaneous hydrolysis in aqueous solution to *p*-chlorophenol with concomitant loss of ability to inhibit hydrolysis of the phenylcarbamate isopropyl phenylcarbamate (propham). A phenylcarbamate-degrading soil *Arthrobacter* sp. had no direct effect on PCMC itself but formed 4-chlorocatechol during the metabolism of *p*-chlorophenol. (Author abstract by permission)

75-2230. Vevai, E. J. (Author address not given). **Know your pesticide, its salient points and uses in pest control.** *Pesticides* 8(11): 15-23; 1974.

Data on the toxicity of dichlorvos and information on pest control, manufacturing, history of development, physical and chemical properties, residues, poisoning, and method of analyses is presented. The maximum acceptable daily intake of dichlorvos is 0.004 mg/kg body wt. Rats fed for 90 days on a diet containing 1000 ppm showed no signs of intoxication. Rats exposed to air containing 20 μg of dichlorvos died within 48-83 hr. Monkeys and rats exposed for 24 hr at 2 mg/ft^3 of air showed no cholinesterase (ChE) depression. Levels of ChE were studied in men operating 4% dichlorvos fogging machines for 16 hr/wk. No decrease in concentration of plasma or in red blood cell enzyme was found during a period of four months. In general, dichlorvos has very low toxicity to fish and is not toxic to quail; it is highly toxic to bees. Topical LD50 dose to housefly is 0.03 mg/fly or 0.6 mg/kg; for German cockroach it is 4 mg/kg body wt. When dichlorvos is applied to plants in recommended dose, it is safe for crops. Dichlorvos administered in the diet up to 500 ppm exerted no influence on the reproduction of rats tested for three generations; litters of suckling rats showed no adverse signs when their mothers were fed with daily doses as high as 40 mg/kg.

75-2231. Kamimura, S.; Nishikawa, M.; Saeki, H.; Takahi, Y. (Central Res. Labs., Sankyo Co., Ltd., Tokyo, Japan). **Absorption and metabolism of 3-hydroxy-5-methylisoxazole in plants and the biological activities of its metabolites.** *Phytopathology* 64(10): 1273-1281; 1974. (22 references)

The absorption and metabolism of the soil fungicide, 3-hydroxy-5-methylisoxazole (Tachigaren, Hymexazol) was investigated in cucumber, tomato, and rice plants. Absorption into the roots of seedlings from nutrient solutions was rapid. Translocation into leaves occurred 24 hr after treatment. Movement was readily traced from treated to untreated rootlets, which also exuded small amounts of the chemical. The fungicide was converted into 2 major metabolites, MU [3-(β-D-glucopyranosyloxy)-5-methylisoxazole] and ML [2-(β-D-glucopyranosyl)-5-methyl-4-isoxazolin-3-one] in roots and shoots of the treated plants. MU and ML were isolated and purified as crystals by column chromatography, and their structures determined by spectroscopic analysis of mass, NMR, IR and UV spectra, optical rotatory dispersion curves, and acid hydrolysis. No phytotoxic effect of ML was noted on cucumber and rice seedlings. MU retarded the growth of germinated rice seed when applied at the high concentration of 1,500 μg/ml, as did the original fungicide at the same concentration. However, MU exerted less of a suppressive effect on water uptake by rice seedlings than did 3-hydroxy-5-methylisoxazole. The parent fungicide and MU displayed toxic activity against *Pythium debaryanum*, but ML was inactive in this respect.

75-2232. Strzelec, A. (Inst. Cultivation, Fertilization, and Soil Science, Pulawy, Poland). **Mikrobiologiczny**

rozklad *s*-triazynowych herbicydow w glebie. [Microbiological decomposition of *s*-triazine herbicides in soil.] *Postepy Nauk Roln.* 20(2): 23-39; 1974. (120 references) (Polish)

An extensive review is presented on the decomposition of *s*-triazine herbicides in soil. The following factors influence the speed of degradation: 1) microbial decomposition; 2) chemical decomposition as a result of photochemical reactions, hydrolysis, and oxygenation, 3) adsorption on surface or organic and mineral particles; and 4) adsorption and decomposition by plants. The degree of decomposition is influenced by temperture, humidity, pH, content in organic substances, soil consistency, intensity of sun's rays, and frequency of herbicide application. Numerous strains of fungi, actinomycetes, and bacteria are capable of using *s*-triazine as a source of energy. Both carbon and nitrogen can be utilized. The degree of decomposition is in large measure dependent on the chemical structure of the molecule. The methoxy or methyl-thio groups of triazines are more rapidly decomposed than the chloro-*s*-triazines by some microorganisms while others make better use of the latter; some utilize primarily the ethyl groups while others make better use of the isopropyl groups. The decomposition of chloro-*s*-triazine occurs through hydroxylation and dealkylation; some of the resulting compounds remain quite toxic. The methoxy-*s*-triazines are more resistant to biodegradation than the chloro-*s*-triazines but numerous microorganisms are capable of demethoxylation. The biodegradation of methyltri-*s*-triazine probably occurs through oxidation and dealkylation.

75-2233. Scott, M. L.; Zimmermann, J. R.; Marinsky, S.; Mullenhoff, P. A.; Rumsey, G. L.; Rice, R. W. (Dep. Poultry Sci., Cornell Univ., Ithaca, NY 14853). **Effects of PCBs, DDT, and mercury compounds upon egg production, hatchability and shell quality in chickens and Japanese quail.** *Poultry Sci.* 54(2): 350-368; 1975. (40 references)

Dietary polychlorinated biphenyls (PCBs), DDT, and related compounds, in well well-controlled experiments, produced no detrimental effects upon egg shell quality in Single Comb White Leghorn chickens or in Japanese quail. PCBs caused some decrease in egg production and a drastic reduction in hatchability in chickens, but not in Japanese quail. Inorganic mercury as $HgSO_4$ or $HgCl_2$, at dietary levels up to 200 ppm of Hg, had only small effects, if any, upon egg production, fertility, hatchability, egg shell strength, morbidity, and mortality. However, methylmercury chloride at levels which provided 10 or 20 mg of Hg per kg of diet caused severe effects upon egg weight, egg production, fertility, hatchability, egg shell strength, morbidity, and mortality. The results of these experiments demonstrate that the decrease in egg shell quality which has occurred in eggs of White Leghorn hens over the past three decades is not due to contamination of commercial feeds with DDT or its derivatives, or with PCBs. The extent to which environmental contamination with methyl mercury is responsible for decreased egg shell strength in commercial laying hens, and possible synergistic relationships between methyl mercury, DDT, DDE, and PCBs in reducing egg production, hatchability, and shell strength remain to be determined. (Author abstract by permission)

75-2234. Friedman, M. A.; Woods, S.; Sanders, V.; Couch, D. B. (Med. Coll. Virginia, Richmond, VA 23298). **Effects of piperonyl butoxide on dimethylnitrosamine metabolism and toxicity in Swiss mice.** *Proc. Am. Assoc. Cancer Res. Am. Soc. Clin. Oncol.* 16: 160; 1975.

Piperonyl butoxide (PB) was dissolved in corn oil and administered i.p. to Swiss mice. After 45 min, doses of 10, 20, and 640 mg/kg inhibited dimethylnitrosamine (DMN) demethylase by 18%, 37%, and 60%, respectively. The inhibitory effects were marked 0.5 hr after treatment with 640 mg/kg and maximal after 2 hr. The inhibition continued for 24 hr, the enzyme activity being suppressed by 35%. At 48 hr after treatment, there was a 58% stimulation of enzyme activity. There was no change in the *K*m, but the *V*max decreased from 129 to 49 μm CH_2O per min/gm liver. PB (640 mg/kg) also inhibited DMN (500 mg/kg, i.m.) mutagenicity in a host-mediated assay, decreasing the mutagenic frequency by 38%. However, PB had no effect on the alkylation of nucleic acids or proteins in the mouse liver, kidney, lung, or spleen. In addition, pretreatment with 640 mg/kg PB did not affect the DMN LD50.

75-2235. Elias, P. S. (Dep. Health Social Security, London, England). **The medical significance of marine pollution by organic chemicals.** *Proc. R. Soc. London B* 189(1096): 443-458; 1975. (13 references)

Human health hazards arising from organic chemical pollution in the environment may arise due to the persistence of pollutants in the salt water medium, the bioaccumulation of pollutants in the marine food protein, and the localized pollution of the sea shores. Depending on the chemical nature of the pollutant and its biological behavior, the health hazard to man may be of an acute nature for people exposed locally or the result of chronic low level exposure of the general population following the ingestion of contaminated marine food. Assessment of the potential health hazards presented by a marine pollutant is based essentially on an appraisal of information regarding the biological effects of the substance on animals and, where possible, on humans. Toxicological investigations generally attempt to define median lethal dosages, the effects of repeated doses over longer periods of time, metabolism in living organisms, mechanisms of toxicity, reproductive effects, mutagenic and carcinogenic effects, and behavioral effects. In relating the observed results to man, the maximum no-effect level in various species is used to estimate a safe level of exposure. The toxic effects of domestic sewage, organochlorine, organophosphorus, and carbamate pesticides, organic mercury compounds, PCBs, oils and petroleum, and various other organic chemicals are discussed.

75-2236. Wilson, K. W. (Ministry Agric., Fisheries Food, Fisheries Lab., Burnham-on-Crouch, Essex, England). **The laboratory estimation of the biological effects or organic pollutants.** *Proc. R. Soc. London B* 189(1096): 459-477; 1975. (45 references)

The laboratory estimation of the toxic effects of organic pollutants relies on successive investigations of increasing sensitivity. Acute toxicity tests are useful in providing an index of relative toxicity between compounds but are of limited value for making ecological predictions. Many factors can influence the assessment of acute toxicity, but chemical stability of the test solutions and the species of test organisms employed are probably most important. Many sublethal tests are also of limited value because the importance of the measured response is not established for the well-being of the animal community as a whole. The basic requirements of sub-lethal techniques are discussed, especially in relation to compounds (e.g., pesticides) which may exert their toxic action through long-term accumulation in the tissues. The possibility of relating the toxicity of a compound to its chemical structure is also considered.

75-2237. Urbanek-Karlowska, B. (Provincial Inst. Hyg., Warsaw, Poland. **Wplyw niedoborow bialkowych u szczurow na toksycznosc kaptanu. Cz. I. Toksycznosc ostra kaptanu.** [**The effect of protein deficiency in rats on captan toxicity. I. Acute toxicity of captan.**] *Rocz. Panstw. Zakl. Hig.* 26(2): 137-144; 1975. (20 references) (Polish)

The acute toxicity of captan to rats was studied as related to protein content of the diet. The rats were maintained for 20 days on a semisynthetic food (casein-starch) containing 24, 8, and 4% protein. At the close of the 20 days the rats received a single oral dose of captan in soybean oil. The LD50 was calculated using Thompson's method on the basis of Weil's tables. Values were: 17,435 mg/kg (range 15,240-19,815) in rats receiving 8% protein in diet and 2886 mg/kg (range 2352-3542 mg/kg) in rats kept on 4% protein diet. In the control group (24% protein) acute toxicity could not be determined since captan doses up to 17,000 mg/kg did not cause death; the LD100 was above 27,600 mg/kg.

75-2238. Maleszewski, J. (Provincial Inst. Hyg., Warsaw, Poland). **Wplyw pestycydow na wybrane grupy drobnoustrojow wystepujacych w produtach pochodzenia zwierzecago.** [**Effects of pesticides on selected groups of microorganisms occuring in products of animal origin.**] *Rocz. Panstw. Zakl. Hig.* 26(2): 159-163; 1975. (11 references) (Polish)

The effects of pesticides were studied on selected bacterial strains. Methyl parathion, demeton methyl, demeton methyl sulfoxide, malathion, rogor (dimethoate), and fenchlorfos at concentrations of 0.5-1 mg/dm^3 influenced the rate of *Bacillus subtilis* spore growth and the resistance to heating of *Streptococcus faecalis* and *Escherichia coli*. Malathion accelerated the breakdown of starch and saccharose and delayed the breakdown of sorbitol. All changes were of a phenotypic nature.

75-2239. Senczuk, W.; Pogorzelska, H. (Inst. Chem. Anal., Akad. Med., Poznan, Poland). **Przebieg wydalania kwasu 2,4-dwuchlorofenoksyoctowego z moczem.** [**The course of excretion of 2,4-dichlorophenoxyacetic acid with urine.**] *Rocz. Panstw. Zakl. Hig.* 26(2): 217-222; 1975. (9 references) (Polish)

Investigations on the urinary excretion of 2,4-dichlorophenoxyacetic acid (2,4-D) are presented. Formaldehyde was liberated from 2,4-D when the latter (extracted from urine with ethyl ether) was heated. When combined with chromotropic acid, formaldehyde produces a wine-purple color proportional in intensity to the content of 2,4-D. The most effective extraction was obtained after 3 hr and acidification of urine to pH ~ 1. Investigations on rats were carried out for control of 2,4-D extraction in relation to the administered doses, and for control of excretion after daily administration during 18 days of doses of 8.8 mg per rat. Results indicate significant renal damage after administration of 88 mg of 2,4-D corresponding to LD50. Administration of 17.6 mg (1/5 of LD50) also inhibited renal excretion of the preparation. Excretion was greatest during the first 24 hr after administration of 8.8 mg (1/10 of LD50). A systemic decrease of 2,4-D was observed in urine during the following 2 days. Systemic administration of amounts corresponding to 1/10 of LD50 revealed no significant change in 2,4-D excretion during the entire experimental period. Excretion is not proportional to the ingested dose when higher doses corresponding to LD50 or 1/5 LD50 are given. 2,4-D determination in urine cannot be applied for elaboration of a quantitative toxicological test.

75-2240. Fishbein, L. (Natl. Cent. Toxicol. Res., Jefferson, AR 72079). **Mutagens and potential mutagens in the biosphere. I. DDT and its metabolites, polychlorinated biphenyls, chlorodioxins, polycyclic aromatic hydrocarbons, haloethers.** *Sci. Total Environ.* 2(4): 305-340; 1974. (148 references)

The mutagenic effects of DDT and its metabolites, polychlorinated biphenyls, chlorodioxins, polycyclic aromatic hydrocarbons, and haloethers are reviewed. Studies on the effect of environmental DDT and the genetics of natural populations suggest that DDT residues are indirectly responsible for alterations in the genetic content of population. There were an unprecedented number of genetic and chromosomal mutants among mice in the Andes with DDT suspected to be the causal agent. Studies on the mutagenic effects of polychlorinated biphenyls report that embryos of ring doves exhibited a high frequency

of chromosomal aberrations and a high incidence of embryonic death, no chromosomal aberrations were observed in human lymphocyte cultures, and no significant increase in chromosomal abnormalities or inhibition of cellular division in rat bone marrow. High mutagenic frequencies from dioxins were observed in *Salmonella typhimurium* strain TA1532 which is known to revert by frameshift mutation. This indicates an acridine-like behavior causes the genetic effects of dioxins. Benzo(a)pyrene is mutagenic in *Drosophilia, Escherichia coli*, and in the dominant lethal test in mice. Its mutagenicity to mammalian cells of epoxides and other derivatives of polycyclic hydrocarbons is reported. Among the haloethers, bis(2-chlorethyl)ether has been found to be mutagenic in *Drosophila*.

75-2241. Epstein, S. S. (Med. Sch., Case Western Reserve Univ., Cleveland, OH). **The carcinogenicity of dieldrin. Part 1.** *Sci. Total Environ.* 4(1): 1-52; 1975. (125 references)

Chemical carcinogens as a cause of human cancer are discussed, and problems in the recognition of chemical carcinogens including toxicological considerations and general epidemiological considerations are detailed. Carcinogenicity tests of dieldrin and aldrin are reviewed in mice, in rats, in dogs and in monkeys. General comments on dieldrin as an environmental carcinogen are offered including its environmental distribution and the involuntary nature of human exposure. The report concludes that there is a growing and general recognition that the majority of human cancers are due to environmental chemical carcinogens and thus are preventable. There is no basis for the concept of "species-specific" carcinogens. Further, there is no basis for attempted differentiation, from either scientific or regulatory standpoints, of carcinogenicity data derived from the mouse in general, from liver cancer in mice in particular, or from such data in any other species including man. There is no basis for the recognition of "safe" levels of carcinogens in human populations. The carcinogenicity of dieldrin is unequivocally demonstrated in valid independent studies in several strains of mice. Dieldrin is carcinogenic at the lowest dose, 0.1 ppm, yet tested in conventional systems. There is clear indication that dieldrin is carcinogenic in the rat. Studies in the dog and monkey are inadequate. Independent epidemiologic experts have reached similar conclusions concerning the results of limited studies of occupationally exposed adult males to dieldrin and to related and unrelated pesticides. These conclusions are that data from the observations is quite inadequate for the development of valid inferences as to the non-carcinogenicity of dieldrin. The data presented in this report overwhelmingly demonstrates that dieldrin is an unequivocal carcinogen. Its continued use presents a serious potential carcinogenic hazard to man. The already extensive environmental contamination by dieldrin, the stability of dieldrin, and the involuntary nature of general human exposure to it demand immediate cessation of its use.

75-2242. Dubovoi, V. P.; Chkanikov, D. I.; Makeev, A. M. (All-Union Sci.-Res. Inst. Physiopathol., Bol'shie Vyazemy, Moscow, USSR). **Certain characteristics of 2,4-D decarboxylation in plants.** *Sov. Plant Physiol.* 20(6): 1073-1078: 1974. (22 references)

The rate of decarboxylation of 2,4-D-1-C^{14} was determined in plants representing 18 species differing in sensitivity to the herbicide. There was no observed connection between the resistance to 2,4-D and its rate of decarboxylation. Nevertheless, it is hypothesized that destruction of the side chain is an important pathway of detoxification of the herbicide in certain plants (e.g., strawberries). Plants treated with 2,4-D-1-C^{14} evolved $C^{14}O_2$ to a greater extent at night than during the day, the radioactive CO_2 formed during the day being "captured" and used in the synthesis of endogenous substances. The formation of $C^{14}O_2$ after the application of 2,4-D-1-C^{14} to strawberry plants occurred at the same rate as the accumulation of 2,4-dichlorophenol after treatment of the plants with ring-labeled herbicide. Thus, it was hypothesized that the degradation of the side chain of the herbicide begins with breakage of the ester bond, which leads to the formation of 2,4-dichlorophenol and acetate. 2,4-D decarboxylation proceeds to a greater extent in the leaves than in the other organs of the plants.

75-2243. Torstensson, L. (Dep. Microbiol., Uppsala, Sweden). **Effects of MCPA, 2,4,5-T, linuron and simazine on some functional groups of soil microorganisms.** *Swedish J. Agric. Res.* 4(3): 151-160; 1974. (23 references)

The effects of the phenoxy acids MCPA and 2,4,5-T, the phenylurea linuron, and the triazine simazine on microorganisms active in the nitrogen cycle and on cellulolytic organisms were studied in the laboratory and in the field. The herbicides examined did influence the functional groups of the soil microorganisms tested, but at normal field application rates these effects were minor. At higher doses, the effects were more obvious among certain groups of organisms. In the nitrogen cycle, the organisms responsible for nitrification were sensitive to the 2 phenoxy acids and linuron at the higher dose levels, but not to simazine. While the proteolytic organisms were not sensitive to any of these herbicides, and the denitrifiers and cellulolytic organisms were stimulated by simazine. The latter organisms were influence negatively by higher doses of MCPA, 2,4,5-T, and linuron in the laboratory tests, but only linuron produced a significant depression in the number of cellulose decomposers in 1 of 2 soils tested in the field experiments.

75-2244. Moore, J. A.; Vos, J. G. (Natl. Inst. of Environ. Health Sci., Natl. Inst. of Health, Research Triangle Park, NC). **Evaluating the rodent immune system as a focus for teratogenic effects.** *Teratology* 9(3): A-29; 1974.

The immune system can best be evaluated by monitoring functional responses with morphological characteristics of secondary or supplementary benefit.

Functional levels of cellular or humoral components must be determined separately because of temporal variations in maturation within an individual and across species. Causes of decreased immune capability cannot be determined without considering adenohypophysis, adrenal and thyroid function, and nutritional and maternal health. TCDD (2,3,7,8-tetrachloro-*p*-dioxin) is often used to assess the role of these factors on immuno-competence. Offspring of rats administered TCDD had impaired cellular immunity. At the same time, allograft rejection time was prolonged; graft versus host activity and response to PHA were both reduced. It seems that cellular immunosuppression was selective since cellular response to the mitogen, conclavin A, was not affected. Working criteria for judging teratogenic potential as related to the immune system should be developed.

75-2245. Baker, R. D.; Applegate, H. G. (Dep. Civil Eng., Environ. Sect., Univ. Texas, El Paso, TX 79968). **Effect of ultraviolet radiation on the persistence of pesticides.** *Tex. J. Sci* 25(1-4): 53-59; 1974. (15 references)

The effect of ultraviolet radiation on pesticides was investigated using purified samples obtained from manufacturers. The purified DDT, mirex, endrin, chlordane, and methyl parathion were subjected to biologically effective ultraviolet rations of 350 nm. The effects of the ultraviolet radiation were separated from those due to temperature by placing a sheet of aluminum foil over identical samples. Loss of DDT with ultraviolet radiation ranged from 46.3 to 78.4% over a period of 1-20 days respectively. Those samples which had no ultraviolet radiation showed a loss of 8.4 to 35.2% over the same period of time. Mirex showed a similar trend, but it appeared to be more stable than DDT. Losses of chlordane ranged from 59.1 to 94.2% over a period of 4-24 hr respectively. With no ultraviolet radiation, the losses were 8.7 to 32.1% for the same period. From 4-24 hr, samples of endrin had losses ranging from 12.8 to 52.4%, respectively, for the primary peak when ultraviolet radiation was added. The corresponding losses without ultraviolet radiation ranged from 3.8 to 20.1% over the 24 hr period. Losses of methyl parathion ranged from 38.1 to 90.8% over the 2-8 hr period with the addition of ultraviolet radiation. The net effect of the added ultraviolet radiation was 29.5 to 59.3% over the 2-8 hr period.

75-2246. Koelling, K. (Inst. Tierphysiol. Ernaehrungsphysiol., Tieraerztl. Fak., Univ. Munich, Munich, Germany). **Der Einsatz von Pestiziden (Pflanzenschutz, Vorratsschutz, Schaedlingsbekaempfung) in der landwirtschaftlichen Produktion und daraus resultierende Probleme fuer die Erzeugung von Lebenzmitteln tierischer Herkunft: 1. Die Bedeutung der Pharmakokinetik fuer die Aufstellung von Wirkstoff-Toleranzen in Futtermitteln.** [**The use of pesticides (plant protection, stock protection, pest control) in agricultural production and resulting problems for the production of foods of animal origin: 1. The value of pharmacokinetics for the determination of pesticide tolerances in fodder.**] *Tieraerztl. Umsch.* 29(10): 557-564; 1974. (German)

General pharmacokinetic and pharmacodynamic aspects of pesticide residues in animals are discussed with respect to the contamination of foods of animal origin. Due to their persistence, certain pesticides can accumulate through the trophic chains with man as the end link. The permitted level of pesticide residues is extrapolated from the acceptable daily intake. The maximum allowable residue concentration in fodder should be established with view to the prevention of food contamination sufficient to cause health hazards for man. This requires knowledge of the pharmacokinetic parameters of pesticide residues in the animal organism, as the accumulation is a function of the daily intake and of the half-life period of the pesticide and is influenced by species-specific and sex-specific differences. The biological half-life period is modified by such factors as the functional status of detoxification mechanisms, and interaction with other substances. Dynamic equilibrium is reached between intake and elimination after prolonged, more or less constant intake. The body load can be substantially higher than the acute toxic concentration if the blood residue level, representing the active material, is in the subtoxic range. With respect to organochlorine pesticides, the active agent concentration in a given tissue is a function of the daily dose, and the concentrations in different tissues show a functional relationship to each other. Upon determination of the exposure, the active agent concentration in the tissues decreases at a rate proportional to the given concentration.

75-2247. Truhaut, R.; Ferrando, R. (Cent. de Recherches Toxicol. de la Fac. des Sciences Pharm. et Biol., Univ. Rene Descartes, Paris V, 4, Ave. de Observatorie, Paris, France 75006). **La toxicite de relais. I. Principes generaux d'une approche methodologique nouvelle pour l'evaluation toxicologique des additifs aux aliments des animaux d'elevage.** [**Toxicity by relay. I. General principles of a new method for the assessment of toxicity of additives to animal feeds.**] *Toxicology* 3(3): 361-368; 1975. (16 references) (French)

When chemicals are added to the feed of farm reared animals for various purposes, the chemicals may enter the body of the animal. This may result in persistence of residues in food consumed by humans and be potentially toxic after repeated absorption over the greater part of a life span. Safety evaluation of these compounds has proven difficult. The information is often dependent on a number of precise experiments. The methodology called "toxicity by relay" consists basically of the testing of the animal feed, which may contain a variety of residues, in a series of long-term tests in the laboratory. If a safety factor can be applied, this methodology can contribute information which would prove whether or not a substance is permissible in the feed. At the same time, criteria for rejection of other compounds can be developed. Toxicity by relay appears to be useful for toxicological evaluation of feed additives for farm reared animals.

75-2248. Kawatski, J. A.; Bittner, M. A. (Dep. Biol., Viterbo Coll., La Crosse, WI 54601). **Uptake, elimination, and biotransformation of the lampricide 3-trifluoromethyl-4-nitrophenol (TFM) by larvae of the aquatic midge *Chironomus tentans*.** *Toxicology* 4(2): 183-194; 1975. (9 references)

The lampricide TFM is employed to control the parasitic sea lamprey *Petromyzon marinus*. The effects of this toxicant on non-target species must be determined if continued use of this compound is to be permitted in the U.S. The TFM residue dynamics in laboratory populations of *C. tentans* were studied. It was found that chironomids are able to both rapidly eliminate and partially biotransform accumulated TFM. The rate of elimination, like the rate of uptake, was partly determined by the hardness of the water. As water hardness increased, TFM accumulated less rapidly but eliminated more rapidly in chironomids. This is consistent with the physical properties of TFM and with its toxicity to chironomids. In soft water a greater proportion of the TFM molecules exist as free phenols is the more readily absorbed form. Thus in soft waters, TFM is more toxic than in hard waters containing similar total toxicant concentrations. However, since chironomids can excrete unchanged TFM, hard waters tend to promote rapid elimination of accumulated residue. Under continuous exposure to sublethal concentrations, chironomids consistently accumulate only finite amounts of toxicants, after which total body residue levels vary slightly or even decline. This is undoubtedly a reflection not only of the solubility equilibria of TFM and its products between external water and lipoid tissue and membranes, but also of the intrinsic ability of the organism to protect itself via detoxification. It is suggested that the presence of TFM may enhance Bayer 73 absorption, thereby producing synergistic toxicity. The formation of more-polar TFM derivatives is one of the major routes of toxicant elimination by chironomid larvae. TFM-glucuronide or galacturonide and sulfated-TFM are two of the biotransformants. It appears that at least one other non-polar derivative is produced and excreted. Much of the accumulated ^{14}C-residue becomes associated with cell fragments, and it appears that biotransformation occurs just prior to or during the process of elimination.

75-2249. Evdokimov, E. S.; Prigarin, Yu. N. (Turkmen Sci. Res. Inst. Cattle-Breeding and Vet., USSR). **Otdalennye rezul'taty otravleniya zhivotnykh khlororganicheskimi pestitsidami. [Remote effects of poisoning of animals with organochlorine pesticides.]** *Veterinariya (Moscow)* 2: 110-111; 1975. (Russian)

The remote effects of acute poisoning with organochlorine pesticides were studied in cattle. The animals treated had undergone lesions of the cerebrum and spinal cord in the form of chronic encephalomyelitis and showed pareses of the hind legs at the beginning of the therapy. The animals were administered vitamin B12 daily and ascorbic acid every 5 to 7 days for 30-35 days. The vitamin therapy, associated with nutritive diet, brought about slight improvement in serious cases, while moderate to mild cases showed nearly complete recovery. Histological examination of one slaughtered animal with complete recovery revealed no residual effects of encephalomyelitis except for the atrophy of the gray matter of the spinal cord and cirrhotic changes in the liver.

75-2250. Zhavoronkov, N. I.; Verkhovskiy, A. P. (All-Union Inst. Exp. Vet., USSR). **Glyutation-peroksidaznaya aktivnost' krovi pri otravlenii zhivotnykh triallatom. [Glutathion peroxidase activity of the blood in animals poisoned by triallate.]** *Veterinariya (Moscow)* 4: 91-92; 1975. (Russian)

The glutathion level and the glutathion peroxidase activity of the blood was studied in swine, sheep, and rabbits poisoned with 300, 500, and 720 mg/kg doses of triallate. Statistically significant increases in the total glutathion level of the blood were observed, especially during the first ten days after poisoning. At the same time, increase in the oxidized fraction, and reduction in the reduced fraction of glutathion were found. The peroxidase activity of the blood was inhibited by 22.5-42.3% during the first 8 days after poisoning. Triallate induced hyperglycemia during the first days. The osmotic resistance of the peripheral blood erythrocytes in rabbits was disturbed during the first 6 days. The changes observed indicate the inhibition of the redox processes of the organism. The increased total glutathion level may be a compensatory phenomenon under the conditions of reduced oxygen assimilation, or it may be related to detoxification processes. Hyperglycemia may be due to the hypoxic syndrome, and to the excitation of the adrenergic innervation. The decrease in the reduced glutathion fraction may be due to the disturbance of NADP reduction.

75-2251. Gierenko, D. B.; Klisenko, M. A. (Lab. Pestic. Anal. Chem., All-Union Sci. Res. Inst. Hyg. Toxicol. Pesticides, Polymers, and Plastics, Kiev, USSR). **Uskorennyy metod opredeleniya ostatochnykh kolichestv nekotorykh fosfororganicheskikh pestitsidov v pishchevykh produktakh rastitel'nogo proiskhozhdeniya i v vode. [Rapid method for the determination of residual quantities of certain organophosphorus pesticides in foods and in water.]** *Vop. Pitan.* 2: 79-83; 1975. (7 references) (Russian)

A rapid method is described for the detection and determination of residues of organophosphorus pesticides, such as of rogor, metaphos, thiophos, and carbophos, in plant materials and in water. The method is based upon differential extraction and selective detection of the residues. The residues are first extracted from plant samples with distilled water, from which they are reextracted with chloroform. The chloroform extract is evaporated, and the dry residue is dissolved in water for reextraction with chloroform. Hexane is used for the extraction of residues from water. The samples, thus purified, are determined gas-chromatographically, using thermionic detector, a column with chromosorb W with 5%

SE-30. The column temperature is 185°C. Nitrogen, hydrogen, and air are used for the determination. The sensitivity of the method is 0.01 mg/l for water, and 0.05 mg/kg for plant materials.

75-2252. Fitzgerald, G. P. (Univ. Wisconsin, Madison, WI). **Are chemicals used in algae control biodegradable?** *Water Sewage Works* 122(5): 82-85; 1975. (7 references)

Data collected during tests performed over the last 11 years has indicated that the algicides that have been used to control the growth of problem-causing algae, products containing copper, silver, mercuric chloride, phenyl mercuric acetate, and quaternary ammonium compounds, do not pose a threat to aquatic environments if used at the minimal concentrations required to be effective, because these concentrations are biodegraded by the treated algae. However, all chemicals to be added to the aquatic environment should be evaluated, since at least one compound—methyl mercuric chloride—is not detoxified by the action of treated algae and its use as an algicide would pose a threat to the general environment. Tests using *Chlorella, Selenastrum, Microcystis, Anabaena circinalis*, and *Phormidium inundatum*, are briefly reviewed.

75-2253. Burfield, I.; Williams, D. N. (Author address not given.) **Control of parthenogenetic chironomids with pyrethrins.** *Water Treat. Exam.* 24(1): 57-67; 1975. (7 references)

Stability tests carried out with pyrethrins are detailed, and subsequent full scale dosing of a distribution system polluted with chironomid larvae, together with details of the GLC equipment and the method used to monitor pyrethrin levels are discussed. Pyrethrins were successful in combatting the chironomid infestation in the distribution system, but with the *Paratanytarsus* species, either a few escaped treatment or were in the egg stage and repopulated the system-in large numbers in 4 months time. A second dosing program was undertaken in which 615 l of 2% pyrethrin concentrate was used and 490 Ml were treated for a period of 10 days. This second dosing appeared to end the problem. The loss of pyrethrins through the system was low enough to require no further dosing in the distribution system. This was also experienced by another water undertaking which applied a dose of 0.01 mg/l with great success to a supply of 82000 m^3/day for 5 day periods at 6 monthly intervals for the control of *Asellus*.

75-2254. Sztankay-Gulyas, M.; Lang, F. (Natl. Inst. Public Health, Budapest, Hungary). **Mosquito control with integrated method.** *Wiad. Parazytol.* 18(4-5-6): 629-633; 1972. (10 references)

Larvae of *Anopheles maculipennis* and *Chaoborus pallidus* were collected and treated with 1-10 ppm abate. Both concentrations caused 100% mortality among both species within 24 hr. At 10 ppm, the *Anopheles* larvae died within 9 hr and the *Chaoborus* larvae died within 18-20 hr. Neither concentration had any effect on *Cyclopidae* or *Hydrocroidae*; some *Daphniae* in both the control and abate-treated tanks died, probably because of anoxia. Sand granule and Celatom granule formulations of abate (10 and 100-200 ppm) had no toxic effects on the ornamental fish *Lebistes reticulatus, Xiphophorus maculatus*, or *Mycrophyllus* sp. The results suggest that abate may provide an efficient and environmentally safe means of mosquito control.

75-2255. Turov, M. I.; Smusin, Ya. S.; Babakhanyan, R. V. (Dep. Forensic Med., I. P. Pavlov First Leningrad Med. Inst., Leningrad, USSR). **Skorost' ischeznoveniya iz tsirkuliruyushchey krovi ingibitorov kholinesteraz v zavisimosti ot ikh khimicheskoy struktury.** [**Rate of elimination of cholinesterase inhibitors from the circulation blood as a function of their chemical structure.**] *Zh. Eksp. Klin. Med.* 15(2): 21-24; 1975. (2 references) (Russian)

The rates of transfer of cholinesterase inhibitors, such as neostigmine, physostigmine, as well as methylthiophosphonates and their methylsulfomethylate analogs with different lengths of the alkoxyl radical (methyl, butyl, octyl) from circulating blood into other tissues were studied in atropinized and narcotized cats by kymographic tests. The rate of transfer considerably increased under the effect of constant positive charge in the inhibitor molecule. The replacement of the *O*-methyl radical in the phosphoryl section of the molecule by *O*-butyl radical resulted in increased rate of transfer. However, the rates of transfer of derivatives with *O*-octyl radical were slightly lower than those of their analogs with *O*-butyl radical. Also, the rate of transfer increased with the degree of hydrophobicity, which may be due to an increased absorption on both specific and non-specific receptors. Further increase in the hydrophobicity resulted, however, in a reduction of the rate of transfer.

See also 75-2085 75-2096 75-2136 75-2268

75-2256. Jansson, B.; Jensen, S.; Olsson, M.; Renberg, L.; Sundstrom, G.; Vaz, R. (Natl. Swedish Environ. Protect. Board, Spec. Anal. Lab., Environ. Toxicol. Unit, Wallenberg Lab., Univ. Stockholm, Stockholm, Sweden). **Identification by GC-MS of phenolic metabolites of PCB and *p,p'*-DDE isolated from Baltic guillemot and seal.** *Ambio* 4(2): 93-97; 1975. (32 references)

The isolation and identification is described of phenolic metabolites of both polychlorinated biphenyls and DDE in seal and guillemot from the Baltic Sea using combined gas chromatography and mass spectrometry. Dibutyl phthalate and DDT-derived compounds were indicated by gas chromatography in some samples. Two general methods were used for the separation of metabolites from polychlorinated biphenyls and DDE. Method 1 allows the isolation and characterization of a number of different types of compounds and involves nondestructive chromatographic cleanup and partitions. Method 2 was used when only the phenolic metabolites were to be investigated and incorporated thin-layer chromatography. Extracts were treated with sulfuric acid at an early stage, which could result in the loss of certain types of compounds. Discrepancies in the gas chromatographic polychlorinated biphenyl pattern and the pattern of the phenolic compounds indicate different metabolic pathways in seal and guillemot. An approach is presented to improve the residue analysis by including not only the chlorinated hydrocarbons themselves, but also their polar metabolites.

75-2257. Saunders, D. G.; Vanatta, L. E. (Eli Lilly Co., Greenfield Lab., Greenfield, IN 46140). **Derivatization and gas chromatographic measurement of some thermally unstable ureas.** *Anal. Chem.* 46(9): 1319-1321; 1974. (15 references)

During gas chromatography (GC), 1 - (5 - *tert* - butyl - 1,3,4 - thiadiazol - 2 - yl) - 1,3 - dimethylurea (I), a compound with promising herbicidal activity, undergoes thermal decomposition to yield methyl isocyanate and 2 - (*tert* - butyl) - 5 - methylamino - 1,3,4 - thiadiazole (II). When reacted with dichloroacetyl chloride, I yielded a derivative which was stable during GC and eluted intact; however, a satisfactory yield of this product was not obtained. When reacted with trifluoroacetic anhydride, I yielded an *N*-trifluoroacetyl product (III) in greater than 99% yield; this derivative was also stable during GC and eluted intact. Using the electron capture detector, the minimum detectable amount of III was 2.9 fmol/sec. Three other urea herbicides, diuron, fenuron, and monuron, were all successfully reacted with methyl iodide to produce the trimethylated compounds; however, only fenuron and monuron reacted with trifluoroacetic anhydride. Combined GC-MS proved to be the ideal identification tool for all derivatives prepared. The data suggests that derivatization reactions can be performed on trisubstituted ureas to form products with enhanced thermal stability and increased sensitivity of detection. Such derivatives should be useful for developing sensitive analytical procedures for these compounds.

75-2258. Gibson, K.; Guilbault, G. G. (Chem. Dep. Tech. Univ. Denmark, Lyngby, Denmark). **A potentiometric assay of cholinesterase.** *Anal. Chim. Acta* 76(2): 245-251; 1975. (17 references)

Methods are described for the assay of cholinesterase activity, based on the linear rate of change of pH of a weak tris buffer at a pH around its p*K*a value, measured with a glass electrode. Two methods are proposed: one a static semiautomatic method capable of doing up to 12 assays/hr; the second, an automated continuous flow approach which does 40 assays/hr. The methods developed are practical in design and are comparable in speed to automated spectrophotometric methods. The precision obtained (2.6%) is better than that obtained with the spectrophotometric method (5.0%). However, the method has limitations since factors other than the hydrolysis of acetylcholine may result in a change of pH of the very weak buffer used. The absorbance of atmospheric carbon dioxide by the buffer was a second problem source.

75-2259. Kaemmerer, H.; Lotz, W.; Pachta, K. (Inst. Organische Chem., Univ., Mainz, Mainz, Germany). **Adsorption und Spaltung des Phosphorsaeureesters Methylparathion an Anionenaustauscherharzen mit Polystyrolgeruest. [Adsorption and splitting of the phosphoric acid ester methylparathion on anion exchanger resins with polystyrene structure.]** *Angew. Makromol. Chem.* 44(689): 191-192; 1975. (2 references) (German)

The adsorption and splitting of methylparathion in methanol on polystyrene type anion exchangers with low to strong basicity was studied on an adsorber column. Neither methylparathion nor its metabolite, *p*-nitrophenol, were detected in the eluate up to inputs of 4 g methylparathion per 50 ml anion exchange resin. Desorption of methylparathion and its metabolite by means of 6N hydrochloric acid was possible at a rate of 80-100%, with the higher values being obtained for strong basic anion exchange resins. The rate of splitting on the anion exchange resin ranged from 50 to 95%, with the higher values being obtained for strong basic anion exchange resins. The findings indicate the suitability of basic anion exchange resins for the retention of methylparathion type pesticides in drinking water.

75-2260. Peterson, J. E. (U. S. Fish Wildlife Serv., Wildlife Res. Cent., Denver, CO 80225). **A microanalytical method for 4-aminopyridine in sunflower seeds and plants.** *Bull. Environ. Contam. Toxicol.* 13(6): 641-645; 1975. (6 references)

A microanalytical method was developed to detect and estimate 4-aminopyridine residues in sunflower plants and ripe seeds at levels as low as 2-3 ppb. The residues are extracted from the ground samples using a mixture of n-butyl acetate and 15% NaOH. For the seeds, the volume of extractable oil should be determined by Soxhlet extraction. 4-Aminopyridine is removed from the aqueous portion of the mixture by passage through a cation exchange

resin. Detection is by flame ionization, although an electrolytic conductivity detector would serve equally well. With a carefully prepared and well-conditioned Carbowax 20 M/Chromosorb 750 column, detection in linear down to about 10 ng, and recovery usually ranges between 50-70%. However, since recovery may vary somewhat with the plant variety, moisture content, average particle size, etc., a correction factor should be derived by analyzing a second sample overspiked with an amount of 4-aminopyridine approximately equal to the first recovered. A simple identity confirmation may be made by thin-layer chromatography.

75-2261. Putnam, T. B.; Bills, D. D.; Libbey, L. M. (Dep. Food Sci. Technol., Oregon State Univ., Corvallis, OR 97331). **Identification of endosulfan based on the products of laboratory photolysis.** *Bull. Environ. Contam. Toxicol.* 13(6): 662-665; 1975. (3 references)

The α-and β-isomers of endosulfan were individually exposed to a UV lamp in the laboratory, and the photolytic products were separated by electron capture gas chromatography (GC) and characterized by mass spectrometry (MS). α-Endosulfan was photolyzed to yield three new GC peaks (A1, A2, A3) and β-endosulfan yielded four new peaks (B1, B2, B3, B4). Peak B2 was identified by GC and MS as α-endosulfan, and peaks A3 and B1 showed similar GC retention times. Peak A3 may have resulted from the loss of Cl and H_2S from endosulfan, and peak B3 may have resulted from the loss of (Cl + SO_2 + H_2O). The photolytic products obtained in this study formed characteristic GC "fingerprint" patterns which would be useful for routine confirmation of the identity of endosulfan without resorting to MS. Smaller laboratories without MS capability could easily be equipped to carry out such an analysis.

75-2262. Lokke, H. (Natl. Food Inst., Dep. Food Additives, Pesticides Contaminants, Soborg, Denmark). **Analysis of free and bound chlorophenoxy acids in cereals.** *Bull. Environ. Contam. Toxicol.* 13(6): 730-736; 1975. (6 references)

An analytical procedure has been developed for the analysis of bound chlorophenoxy acids in cereal grains. The starches in the grains are hydrolyzed under acidic conditions, treated with diastase, and the amino acid conjugates further hydrolyzed through the action of proteolytic enzymes. Using this procedure combined with alumina chromatography purification and electron capture gas chromatographic analysis, the residue levels of 2,4-D and dichlorprop were determined in barley plants sprayed at different times throughout their growth. The results indicated that the extraction procedure is of major importance in the determination of chlorophenoxy acid residues in grains. The conventional procedure of extraction with a mixture of diethyl ether and hexane is insufficient, much greater efficiency being obtained with hydrolysis by proteolytic enzymes. However, neither this latter procedure nor a comparable acetonitrile procedure can be considered fully efficient, although they do present improvements for the determination of free and bound chlorophenoxy acids in cereal grains.

75-2263. Peterson, J. E. (U. S. Fish Wildlife Serv., Wildlife Res. Cent., Denver, CO 80225). **A gas chromatographic method for sodium fluoroacetate (Compound 1080) in biological materials.** *Bull. Environ. Contam. Toxicol.* 13(6): 751-757; 1975. (4 references)

A gas chromatographic method for the detection of low levels of sodium fluoroacetate (compound 1080) has been developed. The sample is ground and stirred into water, which is then acidified. Fluoroacetic acid is then efficiently removed from the aqueous solution by stirring with a weakly basic anion exchange resin, filtering off the resin beads, and recovering the absorbed fluoroacetic acid as its sodium salt. The filtrate is then dried and distilled at 195-200°C. The acids recovered in this manner are rinsed with absolute n-propanol and concentrated sulfuric acid, and the mixture is heated to produce n-propyl esters of the acids. The esters are chromatographed on Johns-Manville's Chromosorb 102 columns equipped with a flame ionization detector. For samples such as animal stomachs, this method is considerably more sensitive, more specific, and less time-consuming than previously described methods. A typical analysis requires 8 hr and toxicant levels as low as 0.1-0.2 ppm can be detected. The method should, however, be considered semiquantitative since recoveries vary somewhat with the type of sample.

75-2264. Bowman, B. T. (Res. Inst., Agric. Can., London, Ontario, Canada). **Effects of method of clay preparation on subsequent adsorption of the insecticide fensulfothion.** *Can. J. Soil Sci.* 55(2): 105-110; 1975. (14 references)

The manner in which montmorillonite and ilite adsorbents were prepared for batch-type adsorption experiments determined the extent of fensulfothion (Dasanit) adsorption. Curve-fitting techniques produced regression equations for the isotherms generated by four clay systems (Na- and Ca-montmorillonite and ilite) and by the four preparation treatments per system (freeze-dried; freeze-dired, resuspended; freeze-dried, 100% RH; suspension). Only the regression equation isotherms of the Na-ilite system and one treatment comparison of the Ca-ilite system (freeze-dried, 100% RH vs. suspension) were not signficantly different (5% level). In general, the freeze-dried process increased fensulfothion adsorption relative to that for the same clay in suspension. Conditioning freeze-dried clay with water vapor (100% RH) prior to adsorption decreased fensulfothion adsorption relative to the freeze-dried clay (dried over P_2O_5). (Author abstract by permission)

75-2265. Steinwandter, H.; Buss, H. (Hessische Landwirtschaftliche Versuchsanstalt, Darmstadt, Germany).

Eine einfache Methode zur selektiven Bestimmung von Hexachlorbenzol. [**A simple method for the selective determination of hexachlorobenzene.**] *Chemosphere* 4(2): 105-106; 1975. (8 references) (German)

A method for the selective clean-up and gas-chromatographic determination of BHC is described. Alumina 90 active neutral, product No. 1077 by Merck, with 2.5% water was suitable for the selective isolation of BHC from all other organochlorine pesticides in petroleum ether extracts. Elution from the alumina column is done with petroleum ether. The sample is concentrated for subsequent gas-chromatographic determination with electron capture detector. The recovery rate ranges from 90 to 100%. Quantitative separation is possible even from BHC isomers.

75-2266. Mithyantha, M. S.; Perur, N. G. (Dep. Chem. Soils, Agric. Coll., Hebbal, Bangalore, India). **A new colorimetric method for the estimation of carbofuran in pesticide formulations.** *Curr. Sci.* 43(18): 578-579; 1974. (4 references)

A new colorimetric method for the estimation of carbofuran (2,3-dihydro-2,2-dimethyl-7-benzofuranyl methyl carbamate) in pesticide formulations is described. The method is based on the hydrolysis of carbofuran. Carbofuran is hydrolyzed under alkaline conditions to its phenol which couples with the diazonium salt formed by reaction of sulphanilic acid with a nitrite, and results in the production of an orange colored solution, in accordance with the Beer-Lambert law. The method is satisfactory for formulations of carbofuran and for the aqueous solutions containing the compound. When the commercial formulations are dissolved in methanol, they should not be exposed to light. Preferably, a fresh solution should be used for the estimation. The orange color of solution has an absorption maximum at 490-495 nm; the color is stable even up to 15 hr.

75-2267. Chen, J. I. (Memphis State Univ., Memphis, TN 38111). **Studies of pesticide analysis by phosphorimetric methods.** *Diss. Abstr. Int.* 35(11): 5270B-5271B; 1975.

The phosphorescence characteristics of eighty-one pesticides were surveyed in EPA (a mixture of diethyl ether, isopentane, and absolute alcohol in the volume ratio of 5:5:2) solvent at 77°K. Forty-seven of these pesticides phosphoresce sufficiently that extraction spectra, emission spectra, and limits of detection can be tabulated. In addition, twenty-three pesticides were studied in ethanol-water solution by using a rotating capillary sample tube; by this method the analytical procedure was simplified. The limit of detectable quantitites of pesticides were lowered to the nanogram range. Acridine yellow was demonstrated to be a suitable internal standard for phosphorimetric determination of these pesticides. A standard deviation of less than 3% for the analysis of a single pesticide and less than 4.8% for a pesticide mixture are reported. (Author abstract by permission. Copies of thesis are available from University Microfilms, Order No. 75-10,056)

75-2268. Kende, A. S.; Wade, J. J. (Dep. Chem., Univ. Rochester, Rochester, NY 14627). **Synthesis of new steric and electronic analogs of 2,3,7,8-tetrachlorodibenzo-*p*-dioxin.** *Environ. Health Perspect.* (5): 49-57; 1973. (10 references)

Three 2,3-dihalo-dibenzo-*p*-dioxins were prepared by the catechol condensation route to study the biological effect of varying the halogen atoms. Biologicallly inactive intermediates were cleanly dihalogenated in the 7,8-positions to yield highly toxic tetrahalo compounds. A concise summary of present knowledge of structure activity relationships for the dibenzo-*p*-derivatives leads to these rules: two halogen substituents at positions 2,3 and one halogen at position 7 are minimum structural requirements; bromine as a substituent is more active than chlorine, which is more active than fluorine; at least one hydrogen atom must remain on the dibenzo-*p*-dioxin nucleus. No amount of halogen substitution on only one ring leads to biological activity. The aryl hydrocarbon hydroxylase induction activities relative to TCDD (dioxin) for this series ranged from 0 to 1.1.

75-2269. Gorbacheva, N. A. (Sci. Res. Inst. Forensic Med., Minist. Public Health USSR, Moscow, USSR). **Ob izbiratel'nosti obnaruzheniya trikhlormetafosa-3.** [**On the selectivity of the procedure for detecting trichlorometaphos-3.**] *Farmatsiya (Moscow)* 6: 34-36; 1974. (4 references) (Russian)

The selectivity of the thin-layer chromatographic detection and determination of TCM-3 was studied in cadaverous materials in the presence of other organophosphorus pesticides and medicinal preparations. Extraction is done with hexane in the presence of anhydrous sodium sulfate. The extract is first cleaned by redistribution in the hexane-dimethylformamide system, and then by thin-layer chromatography on KSK silica gel in a 5:3 ratio of cyclohexane and chloroform. Following elution with chloroform, the pesticide is identified by thin-layer chromatography, using KSK silica gel layer and a 5:3 ratio of cyclohexane and chloroform as a solvent system. The chromatogram is visualized with palladium reagent or 4-aminoantipyrine. The method is selective and specific for TCM-3 in the presence of anthio, butyphos, diazinon, dursban, carbophos, koral, methylmercaptophos, sayphos, dimethoate, phosaline, phthalophos, and cideal, as well as of the medicinal preparations thiophosphamide, thiodepine, phenothiazine, chloropromazine, isopromethazine, aminazine, mepazine, levomepromazine, disulfiram, and TMTD. Ronnel interferes with the determination.

75-2270. Hladka, A.; Kovac, J.; Krampl, V. (Inst. Ind. Hyg. Occup. Dis., Bratislava, Czechoslovakia). **Residue determination of organophosphorus pesticides in animal tissues by temperature programmed GC and TLC methods.** *Fresenius' Z. Anal. Chem.* 274(5): 371-373; 1975. (8 references)

A multiresidue method of analysis for organophosphorus pesticides was developed. Pesticides and their toxic metabolites, oxones, were semiquantitatively estimated in muscles, liver, and whole blood with the air of thin layer chromatography and enzymatic detection. Using the sweep codistillation method, the average yield for cleanup of fenitrothion and malathion extracts from blood, muscles, and liver was 82% and 87%, respectively, at the level of 0.01-0.02 ppm. The *Rf* values of paraoxon, fenitrooxon, and malaoxon in the solvent systems I (chloroform/acetate (97:3, v/v), and II (hexane/acetone (70:30, v/v) were 0.42, 0.53, and 0.63, respectively. The average recovery of the procedure was 82% for fenitroxon, 89% for paraoxon, and 78% for malaoxon. The sensitivity of estimation for malaoxon was 0.01 ppm and that for fenitroxon and paraoxon was 0.002 ppm. The chromatogram of extract of bovine muscle containing 1.0 ppm of the individual organophosphorus pesticides is illustrated. Suitable separation of compounds with a short retention time was achieved in a column packed with 5% OV 1 and with the use of a temperature program within 160-195°C, while for the other pesticides a separation at 195°C was satisfactory.

75-2271. Verma, B. C.; Kumar, S. (Dep. Chem., Punjabi Univ., Patiala, India). **Note on the non-aqueous oxidimetric determination of some water insoluble metal xanthates and dithiocarbamates.** *Fresenius' Z. Anal. Chem.* 274(5): 383; 1975.

The oxidimetric determination of water insoluble metal xanthates and dithiocarbamates using dimethylformamide as a solvent is described. Aliquots of the ethylxanthates and diethyldithiocarbamates of cadmium, zinc, lead, and mercury (II) were dissolved in dimethylformamide, cooled to room temperature, and titrated with 0.05N iodine monobromide solution in the same solvent. The end point was detected visually by the yellow color imparted to the solution by the first drop of the reagent in excess. It could also be well detected potentiometrically using a platinum wire as indicator electrode and tungsten as reference electrode. A sharp potential jump was observed in the end point. Quantities from 5-55 mg can be determined visually or potentiometrically with a maximum standard deviation of about ± 0.8%. The potential jump is in the range of 25-80 m V/0.05 of 0.05 N IBr solution. It was not possible to employ this method for the analysis of the corresponding T1(I) and Bi(III) compounds.

75-2272. Reichling, J.; Fischer, H. (Inst. Pharm. Biol., Univ. Heidelberg, D-6900 Heidelberg, Germany). **Chromatographie von Carbamat-und Phenylharnstoff-Pesticiden auf Duennschichten von basischem Zinkcarbonat. [Chromatography of carbamate and phenylurea pesticides on thin layers of basic zinc carbonate.]** *Fresenius' Z. Anal. Chem.* 275(3): 201-202; 1975. (10 references) (German)

Thin layers of basic zinc carbonate can be used with good results for separation and multiple identification of carbamate and phenylurea pesticides. Five important substances could be separated by one-dimensional TLC. The best results were obtained with the following developing solvents: a) benzene, b) a mixture of benzene/petroleum ether/chloroform (6:1:1). The substances are recognizable in short-wave UV light, when a fluorescence indicator (F 254 nm) is added; or in daylight, after spraying with a solution of 0.1 N $AgNO_3$ in 3 N HNO_3, followed by UV-exposure for about 4 min. (Author abstract by permission)

75-2273. George, D. A.; McDonough, L. M. (Yakima Agric. Res. Lab., ARS, USDA, Yakima, WA 98902). **Microdetermination of bioethanomethrin.** *J. Assoc. Off. Anal. Chem.* 58(4): 781-789; 1975. (5 references)

A microanalytical method was developed for the determination of an experimental synthetic pyrethroid insecticide bioethanomethrin ((5 - benzyl - 3 - furyl)methyl *trans* - (+) - 3 - (cyclopentylidenemethyl) - 2,2 - dimethylcyclopropanecarboxylate). After saponification, trichloroacetyl chloride is used to form an ester from the alcohol moiety, and trichloroethanol is used to form an ester from the acid moiety. Infrared and mass spectral data support the expected structures of the derivatives formed. Nanogram sensitivity is realized by utilizing a gas chromatograph with an electron capture detector. (Author abstract by permission.)

75-2274. Onuska, F. I.; Boos, W. R. (Can. Cent. Inland Waters, Anal. Methods Res. Subdiv., Burlington, Ontario, Canada). **Gas-liquid chromatography and mass fragmentography of *S*-*n*-propyl *N*-monoalkyl dithiocarbamates.** *J. Chromatogr.* 99: 291-299; 1974. (5 references)

An investigation was undertaken to evaluate Apiezon L, silicone oil DC-200 and Reoplex 400 liquid phases for the separation of *S*-*n*-propyl *N*-alkyl dithiocarbamates where the alkyl group contained one to four carbon atoms. The Kovats retention indices for these liquid phases were determined in the range of 160° to 210°. Individual mass spectra of the *N*-monoalkyl dithiocarbamates by electron impact were recorded and the fragmentation pathways were evaluated. A method using mass fragmentography for the quantitative determination of *N*-alkyl dithiocarbamates was developed using their molecular

ions at *m/e* values of 149, 163, 177 and 191 for single-ion monitoring. (Author abstract by permission)

75-2275. Szokolay, A.; Uhnak, J.; Sackmauerova, M.; Madaric, A. (Res. Inst. Hyg. 882 01 Bratislava, Czechoslovakia). **Analysis of HCB and BHC isomer residues in food.** *J. Chromatogr.* 106(2): 401-404; 1975. (9 references)

Gas-liquid chromatography (GLC) and thin-layer chromatography (TLC) were used to separate and determine the individual BHC isomers in the presence of HCB residues. In samples of animal food products (butter) and those of biological materials (human fat tissue), a peak which interfered with the α-BHC peak made the quantitative analysis of this isomer impossible in certain instances. The interfering peak was identified as HCB. A column filled with 2.5% XE-60 on Chromosorb W, 80-100 mesh was suitable for the separation of HCB from BHC isomers at 180°C. Using this method it was impossible to determine as little as 0.0001 mg/kg residue in the materials tested. The recovery ranged between 85.6 and 98.5%, being greatest when the extracts were condensed just to dryness by means of a vacuum evaporator. The accuracy varied between 3.00 and 10.42%.

75-2276. Pulusova, O.; Sackmauerova, M.; Madaric, A. (Res. Inst. Hyg., 882 01 Bratislava, Czechoslovakia). **Identification and determination of triazine and diazine herbicides in water by thin-layer chromatography.** *J. Chromatogr.* 106(2): 405-408; 1975. (16 references)

Optimum conditions for the extraction from water, purification, and identification of pyrazone and six trizine derivatives (simazine, atrazine, propazine, desmetryne, ametryne, and prometryne) were studied. The herbicides were extracted with chloroform, methylene chloride, and ethyl acetate, the best yield being obtained with a mixture of chloroform and ethyl acetate. The yield was also improved by adding sodium chloride to the water. The compounds were purified using adsorption chromatography and identified via semiquantitative evaluation of thin-layer chromatograms. With toluene-acetone as the eluting solvent during thin-layer chromatographic analysis, various organochloride insecticides followed the solvent front, while the triazine herbicides and pyrazone were separated according to their respective *R*f values in this system.

75-2277. Cotterill, E. G. (Agric. Res. Council Weed Res. Org., Begbroke, Hill, Yarnton, Oxford, England). **Determination of residues of dalapon in soil by gas chromatography of the 1-butyl ester.** *J. Chromatogr.* 106(2): 409-411; 1975. (26 references)

A method for dalapon residue analysis is reported which involves gas chromatography of the 1-butyl ester. Air-dried soil samples were spiked with dalapon at concentrations of 1.0, 0.1, and 0.05 ppm. The herbicide was extracted using a methanolic solution of 0.1 *M* sodium hydroxide and subsequently esterified. The ester was then injected into a Pye 104 gas chromatograph fitted with an electron capture detector. Under the following conditions, the dalapon butyl ester eluted with a retention time of 1 min 35 sec; column packing, 2% OV-17 Chromosorb WHP 80-100 mesh; carrier gas, nitrogen; flow-rate, 40 ml/min; temperature, column 100°C, injector 250°C, detector 360°C; attenuation 20 x 10^2; pulse time, 150 μsec; chart speed, 300 mm/hr; injector volume, 5 μl. Good recoveries were achieved with 2 soil types at all three levels of fortification; 0.05 ppm being the limit of detection for practical purposes. The accuracy, ease, and speed of performance of this method recommend it for routine analysis.

75-2278. Smith, A. E.; Lord, K. A. (Rothamsted Exp. Stn., Harpenden, Hertfordshire, England). **Method for determining trace quantities of the herbicide chlortoluron in soils by liquid chromatography.** *J. Chromatogr.* 107(2): 407-410; 1975. (6 references)

A method for the routine extraction and liquid chromatography (LC) estimation of chlortoluron residues from soils is described. A slurry of air-dried soils and methanol was evaporated to dryness and then heated under vacuum. The residue was extracted with *n*-hexane. The eluting solvent for the LC analysis was *n*-hexane containing 15% (by volume) 2-propanol at a flow rate of 1.1 ml/min under a pressure of 480 lb/in^2. Samples were injected as *n*-hexane solutions and concentrations of chlortoluron calculated by comparison of peak heights with those of appropriate standards. The standard curve was linear over the range 5-80 ng. Typical liquid chromatograms obtained from 3 μl of a standard solution containing 8 ng/μl of chlortoluron, and from 3 μl of hexane extracts from untreated Rothamsted silty loam and the same soil fortified at the 1.0 μg/g level are illustrated. Elution with 15% 2-propanol in *n*-hexane through the Merckosorb column provided sufficient separation for quantitative measurements. Decreasing the proportion of 2-propanol in the eluting solvent broadened the chlortoluron peak and reduced sensitivity without markedly improving the separation from material extracted from the soil.

75-2279. Aitzemueller, K. (Unilever Forschungsgesellschaft mbH, Hamburg, Germany). **Adsorption liquid chromatography of DDT and polychlorinated biphenyls.** *J. Chromatogr.* 107(2): 411-415; 1975. (16 references)

The adsorption liquid chromatographic (LC) relative retentions of various polychlorinated biphenyls and DDT isomers were determined and their separation was demonstrated by obtaining test chromatograms. Merckosorb SI 60 of average grain diameter was used as the column filling material and dry light petroleum was used as the solvent. The separation of the peaks of polychlorinated biphenyls with average chlorine contents of 54 and 60% from the less retained DDT isomer was very good, but their separation from the major DDT metabolite, *p,p'*-DDE, was not as good. The LC retention characteris-

tics of various polychlorinated biphenyl samples with chlorine contents ranging from 32 to 68% are illustrated. This adsorption LC retention behavior of the polychlorinated biphenyls is in sharp contrast to their gas-liquid chromatographic behavior, where the retention increases with chlorine content. Adsorption LC should permit an easy separation of DDT from the higher chlorinated polychlorinated biphenyls, while polychlorinated biphenyls with low chlorine content will overlap with the DDT group. Polychlorinated biphenyls were extracted from a packing board known to contain the chlorinated hydrocarbons. No peaks for DDT were seen.

75-2280. Burchfield, H. P.; Storrs, E. E. (Gulf South Res. Inst., New Iberia, LA 70560). **Analysis for organophosphorus insecticides and metabolites.** *J. Chromatog. Sci.* 13(5): 202-211; 1975. (67 references)

Some of the procedures are reviewed for organophosphate extraction and cleanup and specific detection systems available for their measurement by GLC, TLC, and spectrophotometry. The emphasis is on multiresidue methods. Methods of cleanup on Florisil, charcoal, and Sephadex are outlined. Sweep codistillation for the analysis of parent organophosphate residues of carbophenothion, diazinon, ethion, malathion, methylparathion, and parathion in kale, beets, carrots, lettuce, apples, potatoes, and strawberries is discussed. Methods for isolation and cleanup of organophosphorus insecticides and their oxones from animal tissues, cereals, and water are described. The columns and operating parameters of gas-liquid chromatography, detectors such as the alkali flame ionization detector, flame photometric detector, and electron capture detector, are considered. The stationary and mobile phases of thin-layer chromatography are reviewed along with methods for visualization of compounds. Multiresidue optical methods included are: automated method for total organophosphates, reaction with 4-(4-nitrobenzyl)pyridine; and the Schoenemann reaction. The analysis of metabolites is also reviewed.

75-2281. Dorough, H. W.; Thorstenson, J. H. (Dep. Entomol., Univ. Kentucky, Lexington, KY 40506). **Analysis for carbamate insecticides and metabolites.** *J. Chromatog. Sci.* 13(5): 212-224; 1975. (198 references)

Of the more conventional pesticides, the carbamate insecticides pose some unique problems relative to residue analysis. Most of the compounds are unstable under conditions normally used for GLC analysis and thus require special attention if this technique is to apply to the carbamates. The carbamate phenol probably occurs on the substrate being analyzed by way of chemical and metabolic processes. Since these compounds usually possess significantly lower mammalian toxicity than the parent compound, it is essential that they be separated from the intact carbamates prior to derivatization. Hydroxylation of the ring and of the *N*-methyl group are common metabolic pathways for carbamate pesticides. However, these compounds may or may not react to form GLC detectable derivatives. Another problem inherent in the derivative approach of *N*-methyl-carbamates relates to interfering materials. While cleanup is nearly always a significant problem in pesticide residue analysis, its magnitude is often much greater with the carbamates. This review on analysis of carbamate insecticides and metabolites concentrates on the literature from 1970 to 1975, with respect to methods and their application to carbamate analysis. Specific gas chromatography methods, including both direct and derivatization methods, are detailed as are thin-layer chromatography methods, enzymatic techniques, detection by in situ fluorescence, high pressure liquid chromatography, and spectrophotometric methods.

75-2282. Yip, G. (Div. Chem. Technol., Food Drug Adm., Washington, D.C. 20204). **Analysis for herbicides and metabolites.** *J. Chromatog. Sci.* 13(5): 225-230; 1975. (28 references)

Recent work in the field of analysis of herbicides and their metabolites is reviewed and future needs are discussed. The regulatory chemist faces an almost impossible task if given a sample and told to analyze it for herbicide residues. There are more than a hundred herbicides having completely ionic to non-ionic characteristics registered for use. This diversity of chemical properties has been one of the stumbling blocks to the development of a generalized analytical scheme applicable to all herbicides. Current methodology for extraction, clean-up, and determination is discussed in some detail. Specific methods for groups of herbicides are provided for chlorinated phenoxy acids, *s*-triazines, phenylureas, carbamates, phenols, dinitroanilines, bipyridiniums, and chlorinated benzoic acids. Mass spectrometry offers the best means for confirming residue analysis results. Specific needs in the areas of analysis in air, soils, foods, and clean-up of sample extracts are exposed.

75-2283. Fishbein, L. (Natl. Cent. Toxicol. Res., Jefferson, AR 72079). **Analysis of insecticide synergists.** *J. Chromatog. Sci.* 13(5): 238-245; 1975. (44 references)

The utility of a variety of chromatographic procedures, including GLC, TLC, PC, and GLC/MS, has been described for the determination of a variety of methylene dioxyphenyl insecticide synergists. Particular focus is placed on chromatographic aspects of the principal synergist, piperonyl butoxide, in relation to its trace impurities, determination in formulation, metabolism, residues, and stability. Some discussion is devoted to miscellaneous methylene dioxyphenyl synergists including tropital, sulfoxide, sesamin, sesamolin, *n*-propyl-isome, piperonyl cyclonene, sesangolin, myristicin, apiol, dill-apiol, *d*-Carvone, elemicin, and 1-allyl-2,3,4,5-tetramethoxybenzene.

75-2284. Cochrane, W. P. (Anal. Serv. Sect., Plant Prod. Div., Canada Dep. Agric., Ottawa, Ontario, Canada). **Confirmation of insecticide and herbicide residues by chemical derivatization.** *J. Chromatog. Sci.* 13(5): 246-253; 1975. (115 references)

In spite of all the increases in sophisticated instrumentation connected with pesticide residue determinations, it is felt that a place still exists in pesticide analysis for chemical reactions which can be used to confirm pesticide residue assignments. These chemical tests are simple and give positive identification quickly which is important for routine operation. Additionally, they contribute to the knowledge of pesticide chemistry. Recent developments in this field are reviewed and attempts to cross reference these developments with similar work in other fields of analysis are outlined. Specific information is provided concerning organophosphorus insecticides, triazines, urea and carbamates, chlorophenoxy acids, organochlorine pesticides, and special techniques.

75-2285. Moye, H. A. (Pestic. Res. Lab., Food Sci. Dep., Univ. Florida, Gainesville, FL 32611). **High speed liquid chromatography of pesticides.** *J. Chromatogr. Sci.* 13(6): 268-279; 1975. (37 references)

The application of high speed liquid chromatography to the analysis of pesticide residues is reviewed. Residue levels in the sub-ppm range can be detected with the chromatographic system in 4 ways: by use of highly sensitive detectors with adequate selectivity; by concentrating the sample to give a representatively large amount of substrate when small volumes are injected; by injecting large volumes of a more dilute sample; and by maximizing column efficiency to minimize dilution of the solute while on the column. Two detectors for high speed liquid chromatography are discussed because of their potentially important application to pesticide residue analysis: an electrochemical detector, and polarographic detector. Future detector development could be the key factor in making high speed liquid chromatography an everyday analytical tool for the pesticide residue analyst.

75-2286. MacNeil, J. D.; Frei, R. W. (Res. Stn., Agric. Canada, Summerland, British Columbia, Canada). **Quantitative thin-layer chromatography of pesticides.** *J. Chromatogr. Sci.* 13(6): 279-285; 1975. (88 references)

Among the earliest thin-layer chromatographic (TLC) techniques applied to the determination of pesticide residues was reflectance spectroscopy. This technique was improved with the development of thin-layer scanners for existing spectrophotometers and fluorometers and later by the introduction of new instruments for in situ analysis of thin-layer chromatograms. These techniques were applied not only to residue analysis, but to quality control in the formulation of pesticides and studies of the possible behavior of pesticides in the environment. The greatest advances in the application of in situ analytical techniques on TLC to pesticide residue analysis, however, came from the use of fluorescence measurements. There are basically four sources of fluorescence for in situ analyses: the native fluorescence of the compound, fluorogenic labelling, release of a fluorescent chelating agent through complexation with the pesticide, and conversion of a nonfluorescent to a fluorescent compound by other means. Additional TLC techniques which have been applied to pesticide residue analysis include thin-layer densitometry, spot area comparison, enzyme inhibition techniques, and liquid scintillation counting. Although quantitative TLC for pesticide residue analysis is still in an exploratory stage, it offers a viable alternative to gas chromatography and high speed liquid chromatography in terms of flexibility, cost, convenience, and sensitivity.

75-2287. Ford, J. H.; McDaniel, C. A.; White, F. C.; Vest, R. E.; Roberts, R. E. (Natl. Monitoring Residue Analysis Lab., Gulfport, MS 39501). **Sampling and analysis of pesticides in the environment.** *J. Chromatogr. Sci.* 13(6): 291-295; 1975. (10 references)

Environmental monitoring programs have been developed to measure the amount of environmental contamination which is directly related to pesticide applications. To establish population trends in animals and environmental impacts, components such as soil, sediment, water, invertebrates, fish, birds, mammals, air, and vegetation must be collected from each preselected sampling site for pesticide residue analysis. A procedure must also be developed for systematically receiving, numbering, and storing the environmental components which are collected. Extraction and clean-up procedures suited to the various types of samples collected must then be applied to ready the samples for residue analysis. Once extracted, the samples can be cleaned-up and separated by florisil column fractionation, acetonitrile partitioning, and silicic acid column separation. Gas-liquid chromatography along with column and thin-layer chromatography can be used to detect pesticide residues at nanogram and picogram levels. The electron capture detector is suited for the analysis of organochlorine and organophosphorus pesticides, and the latter can also be detected using flame-photometric and thermionic detectors. The microcoulometric detector is specific for pesticides containing chlorine, sulfur, nitrogen, and phosphorus.

75-2288. Oller, W. L.; Cranmer, M. F. (Dep. Health, Education, Welfare, Food Drug Admin., Natl. Cent., Toxicol. Res., Jefferson, AR 72079). **Analysis of chlorinated insecticides and congeners.** *J. Chromatogr. Sci.* 13(6): 296-300; 1975. (26 references)

Selected recent developments and the state-of-the-art for organochlorine insecticide residue analysis are reviewed. Qualitative and quantitative analysis of organochlorine insecticide residues generally involves: extraction and partitioning techniques utilizing *p*-value principles; sorption chromatography with separation by selected solvent elution; separation with gas chromatog-

raphic columns of different polarities; quantitative by detectors specific for certain elements contained in the pesticides; and the production of structural changes which modify the relationship between the residues of interest and interfering compounds. These procedures are aimed at the extraction, separation, identification, and quantitation of the compound(s) of interest. Sample preparation remains the major limitation to improvement in the area of organochlorine insecticide residue analysis. Additional research is also needed to develop detectors with greater specificity and to provide sensitive and specific detection systems for high speed liquid chromatography and liquid chromatography in general.

75-2289. Vigier, J.; Yavoub, M.; Marka, C.; Boucherle, A. (Lab. de Chimie et Toxicol., U.E.R. des Sciences Pharmaceutiques et Biol. de Grenoble, 38240 Meylan, Grenoble, France). **Dosage colorimetrique de l'arsenic en toxicologie hospitaliere.** [**Colorimetric determination of arsenic in clinical toxicology.**] *J. Eur. Toxicol.* 7(5-6): 325-329; 1974. (18 references) (French)

Since acute and chronic intoxications by arsenic and its salts through pesticides are frequent, a method for chemical determination is necesary. The tintometric method developed by Vasek and Sedivec, which incorporates arsenic production and a subsequent reaction with silver diethyldithiocarbamate, gave good results, especially when the biological medium (blood or urine) had been mineralized by persulfate in alkaline medium. The medium of mineralization affects the outcome of the determination of arsenic in biological products. The classical methods generally gave poor results: the digestion of the substance by the persulfate in the alkaline medium was the only one to yield consistently good results. Under these conditions, the Vasek and Sedivec method allows for a simple and rapid determination of arsenic contents varying from 2-15 g. Although the method lacks precision, especially concerning organic derivatives of pentavalent arsenic, the technique seems to be appropriate for emergency toxicological analyses and even for forensic use.

75-2290. Tsitovich, I. K.; Semenova, E. I. (Kuban Agri. Inst., Krasnodar, USSR). **Opredelenie mikrokolichestv 2,3,6-trikhlorbenzoata natriya v pochve posle kontsentrirovaniya na anionite.** [**Determination of trace amounts of sodium 2,3,6-trichlorobenzoate in the soil after concentration on anion exchanger.**] *Khim. Sel. Khoz.* 12(7): 63-65; 1974. (3 references) (Russian)

A method for the concentration and determination of trace amounts of sodium 2,3,6-trichlorobenzoate in soil is described. Following extraction with distilled water, the extract is concentrated by a factor of about 100 by passing it through an AV-17 type anion exchanger in Cl form. The substance is subsequently eluted from the anion exchanger with water and is determined photoelectrocolorimetrically with butyl rhodamine in the presence of toluene, using green filter. The limit of determination is 2.5 mg/kg soil.

75-2291. Mel'tser, F. R.; Novikova, K. F. (All-Union Sci. Res. Inst. Chemical Means of Plant Protection, USSR). **Opradelenie ostatochnykh kolichestv DDVF v moloke i vode metodom gazozhidkostnoy khromatografii.** [**Determination of residual amounts of DDVP in milk and water by gas-liquid chromatography.**] *Khim. Sel. Khoz.* 12(10): 788-791; 1974. (8 references) (Russian)

A method is described for the determination of DDVP residues in milk and water by gas-liquid chromatography. The DDVP residue is extracted from water with ethylacetate twice in the presence of sodium chloride. Acetone and 5% potassium oxalate are used for the extraction of DDVP from milk. Then further purification and concentration are done by repeated extractions with sulfur ether and petroleum ether, and fat is removed by freezing. The aqueous solution obtained is extracted with ethyl acetate. Gas-liquid chromatographic determination is done by means of thermionic detector, using chromosorb W 100-120 mesh, silanized DMCS, as well as nitrogen, hydrogen, and air. The column temperature is 200°C. The retention time of DDVP is 3.15 min. The determination is not interfered with by trichlorfon and other organophosphorus pesticides. The limit of detection is 0.01 mg/l. The rates of recovery are 74-100% for milk and 80-100% for water.

75-2292. Prokof'ev, O. N.; Kurilo, N. G. (Kazakh Plant Protect. Stn., Min. Agric. Kazakh SSR, USSR). **Ekspress-metod opredeleniya kontsentratsiy rabochey zhidkosti nekotorykh fungitsidov.** [**High speed method for the determination of the concentrations of certain liquid fungicides formulations.**] *Khim. Sel. Khoz.* 2: 66-67; 1975. (Russian)

An high speed method for the determination of the concentrations of blue vitriol and copper oxychloride spray solutions is described. The method is based upon the interaction of the copper ions with iodine ions introduced in the form of potassium iodide. The liberated iodine is subsequently titrated with sodium thiosulfate solution in the presence of starch until the blue color disappears. The method is suitable for routine check-ups under field conditions.

75-2293. Stillman, R.; Ma, T. S.* (Dep. Chem., City Univ. New York, Brooklyn, NY 11210). **Application of high-speed liquid chromatography to organic microanalysis, II. Separation and polarographic detection of pesticides, vitamins, and analgesics.** *Mikrochim. Acta* 4: 641-648; 1974. (15 references)

The use of high speed liquid chromatography for the separation and quantitation of microgram amounts of phosphate pesticides is described. The feasibility and precision of quantitation was investigated with a series of mixtures of parathion, methyl parathion, carbophenothion, and *p*-nitrophenol. The concentration of the pesticides was varied from 10 to 0.1 μg/μl, while the concentration of the internal standard, *p*-nitrophenol, was kept constant at 10 μg/μl. The separation of μg quantities of the three

pesticides is illustrated on a chromatogram. The complete analysis can be carried out in less than 15 min, and the similarity of the high speed liquid chromatogram to results obtained by gas chromatography is evident. The response ratio reproducibility for each component is in the 1-3% range, which is comparable to the precision of most gas chromatographic techniques.

75-2294. King, E.; Schalin, O. (British Sidac, Wigton, Cumbria, England). **Quality control of plywood chlorine-based insecticide content using an oxygen combustion method.** *Pap. Puu* 4a: 209-212; 1975. (3 references)

An analytical method for the routine determination of plywood chlorine based insecticide content is described. The plywood sample is burned in an oxygen atmosphere, absorbing the hydrogen chloride released in a solution of sodium hydroxide. The chloride formed is estimated potentiometrically using silver nitrate solution. In scale the method employs macro and semi-micro apparatus and techniques as far as the end point titration which is performed on micro scale. Errors involved in the determination are treated statistically. Quality control procedures for monitoring plywood perservative level on the basis of board trimmings are described. About one board per 50 produced will require testing for an insecticide application, depending on the standard deviation obtained for the determination.

75-2295. McLeod, H. A.; Mendoza, C. E.; McCully, K. A. (Food Res. Lab., Health Protect. Branch, Dep. Natl. Health and Welfare, Tunney's Pasture, Ottawa, Ontario, Canada). **Analysis of foods for methomyl using thin-layer chromatography after low temperature clean-up.** *Pestic. Sci.* 6(1): 11-16; 1975. (8 references)

The recovery of methomyl from fortified food samples was determined semiquantitatively by a multi-pesticide residue screening procedure with thin-layer chromatography enzyme inhibition as the detection system. The estimated recoveries from milk, eggs, beef, honey, butter, pork, peas and cabbage were variable: 70-90% for samples fortified at 0.5 mg/kg and 40-90% for 0.05 mg/kg. Emulsion formation during liquid-liquid partition was not encountered. (Author abstract by permission)

75-2296. Businelli, M.; Tafuri, F.; Marucchini, C.; Scarponi, L. (Ist. Chim. Agrar., Univ. Perugia, Cent. Chim. Antiparassit. CNR, Perugia, Italy). **Gas-liquid chromatographic method for perfluidone residues in rice grains and husks.** *Pestic. Sci.* 6(1): 69-73; 1975. (5 references)

A gas-liquid chromatographic method using electron-capture detection is described for the determination of perfluidone residues in rice grains and husks. The procedure consists of extraction, purification on an anion-exchange resin, methylation and further clean-up (if necessary) by adsorption on Florisil. The recoveries from fortified rice grains and husks were respectively 73.5-98% and 77-104% in the range 0.01-0.50 mg/kg. Sensitivity permits detection of perfluidone at 0.005 mg/kg level. (Author abstract by permission)

75-2297. Johansson, C. E. (Natl. Swedish Food Adm., Fack, Stockholm, Sweden). **Two improved methods for the determination of dinocap in fruits and vegetables.** *Pestic. Sci.* 6(1): 97-103; 1975. (12 references)

Gas chromatographic and spectrophotometric methods for the determination of dinocap extracted from apples, strawberries, and cucumbers with organic solvents are described. The methods were combined with an organochlorine pesticide determination procedure in which the sample was extracted with *n*-hexane-benzene (1:1 v/v). The spectrophotometric method is based on the rapid hydrolysis of dinocap by means of ethanolamine. Dinocap reacts with ethanolamine, yielding the corresponding phenolates. The reaction gives within a few minutes a stable color which persists for at least 24 hr. The gas chromatographic method is very useful in dinocap analysis. The conditions are the same as used by Hrivnak and Stota in their determination of free phenolic pesticides. The method can be used alone or together with spectrophotometry or thin-layer chromatography as confirmatory methods.

75-2298. Domanska, H.; Legowiak, Z.; Leska, L. (Agricultural Acad., Warsaw, Poland). **Metodyka oceny trwalosci herbicydow doglebowych testem biologicznym. [A biological method for the determination of persistence of herbicides in soil.]** *Postepy Nauk. Roln.* 22/17(1/150): 77-82, 1975. (10 references) (Polish)

To determine herbicide residues at different layers of soil, samples of soil are removed with a specially prepared tube at 2-4 cm depth interval up to a depth of 12 and 20 cm. Aliquots of 100 g from each layer are mixed with 100 ml of distilled water, agitated for one hour, and then placed in polystyrene beakers into which 1 cm long identations are made at opposite sides. White mustard seedlings *(Sinapis alba)* are used as test plants. They are attached through slits in a polyurethane tape to glass microscope slides which are placed in the identations of the beaker. They are then placed under artificial light for 10-14 days. The water level is adjusted every second day. At end of experiment the weight of fresh plant mass is determined after drying the roots on filter paper. The approximate amount of toxic residues in soil samples and reaction of plants to it can be determined by comparing results to a standard reaction of plants to a known amount of herbicide.

75-2299. Bowman, M. C. (Agric. Res. Stn., Tifton, GA 31794). **Gas chromatographic analysis of pesticide residues containing phosphorus and/or sulfur with flame photometric detection and some ancillary techniques for verifying their identities.** *Progr. Anal. Chem.* 5: 175-192; 1973. (16 references)

Gas chromatography with flame photometric detection is a highly specific and sensitive means of analyzing a wide variety of crops and tissues for pesticides, chemosterilants, and other compounds containing phosphorus and/or sulfur. Through the use of temperature programming, multicomponent analyses for these residues are made with good sensitivity and with little or no cleanup. A compendium of relative retention times of 146 pesticides on 5 thermally stable packings and chromatograms of 39 foods was prepared to facilitate the identification and determination of pesticides in a wide range of samples and in those of unknown history. The dual detector simultaneously monitors the GC effluent for compounds containing P (526 nm filter) and S (394 nm filter); from the response of its two channels the P/S ratio of a compound is readily ascertained. p-Values and behavioral characteristics of these compounds in liquid adsorption chromatography and ancillary means for confirming identities of pesticides are discussed.

75-2300. Keith, L. H. (EPA, Natl. Environ. Res. Cent.-Corvallis, Southeast Environ. Res. Lab., Athens, GA 30601). **Chemical characterization of industrial wastewaters by gas chromatography-mass spectrometry.** *Sci. Total Environ.* 3(1): 87-102; 1974. (11 references)

The use of computer controlled gas chromatography-mass spectrometry (GC-MS) to identify organic pollutants in industrial wastewaters is discussed. Computer controlled GC-MS systems reduce the time required for sample analysis; permit computerized matching of unknown spectra with reference spectra in a continuously expanding library; reduce the mass spectral expertise required for routine GC-MS analyses; and allow rapid routine characterization of industrial wastewaters and identification of pollutants in natural waters. Specific identification and quantification of polluting compounds are significant in characterizing an industrial effluent for enforcement of pollutant control legislation. The widespread capability to quickly identify specific organics responsible for actual or potential pollution problems overcomes a major obstacle of working with unknown organic pollutants. Organic pollutants in seven industrial wastewaters being discharged into the Calcasiru River in Louisiana were identified using GC-MS.

75-2301. Bemelmans, J. M. H.; De Brauw, M. C. T. N. (Cent. Inst. Nutrit. Food Res., TNO, Zeist, The Netherlands). **The presence of chloroanisoles in tainted tobacco.** *Sci. Total Environ.* 3(1): 126-128; 1974. (7 references)

The analysis and identification of chloroanisoles in tobacco using a gas chromatograph0mass spectrometer computer system are described. Cured tobacco from Malawi, Africa had a musty taint and was unfit for consumption. It was analyzed for chloroanisoles because these compounds are known to cause musty taints in various products. A section of the total ion current chromatogram of the tobacco extract together with the selected mass plots for the molecular ions 210 and 244 representing the parent masses of tri- and tetrachloroanisole, respectively, is illustrated. Eight characteristic masses of trichloroanisole were ploteed and, from the pattern of the selected mass plots, it was concluded that the compounds were tri- and tetrachloroanisole. The retention times of all tri- and tetrachloroanisole. The retention times of all tri- and tetrachloroanisole isomers showed the compounds to be 2,4,6-trichloroanisole and 2,3,4,6-tetrachloroanisole. The contamination of the tobacco with chloranisoles cannot readily be explained, although these compounds can be formed from the corresponding chlorophenols by microorganisms. Pentachlorophenol, which contains other chlorophenols as impurities, is used for agricultural purposes during tobacco cultivation.

75-2302. Pertoldi Marletta, G.; Bruni, G.; Coassini Lokar, L. (Author address not given). **Applicazioni dei metodi analitici all'analisi degli additivi alimentari. [Application of analytical methods to analysis of food additives.]** *Rass. Chim.* 26(6): 330-343; 1974. (531 references) (Italian)

An analytical bibliography of many experiments and methods used to remove pesticide residues from foods and milk is presented. The most common pesticide removal methods include the use of distilled water to eliminate chlorine ions, gas chromatography, the use of Florisil columns, electron capture detectors, etc. Many experimenters have given much attention to the removal of polychlorinated biphenyls, generally found in animal fats and cheeses, using chromatography. The combinations of simple chemical reactions with chromatography has enabled researchers to detect the presence of DDT, DDD (TDE), and DDE in cheeses. Chromatography has also detected chlorocholine in wheat. In these cases chromatography has been used along with silica gel and cellulose. The electrogravimeter, the IR spectrometer, and chromatography are used to identify insecticide residues.

75-2303. Matsumoto, H.; Oka, H.; Kawamura, N.; Narafu, T. (Aichi Prefectural Inst. Public Health Nagoya, Aichi, Japan). **[Specimen preparation for analysis utilizing an improved distillator for essential oil. Part 1. On the determination of organochlorine pesticides in cow milk.]** *Shokuhin Eiseigaku Zasshi (J. Food Hyg. Soc. Jpn.)*, 16(3): 165-171; 1975. (13 references) (Japanese)

A new method was devised for utilizing continuous water vapor distillation for extracting and condensing organochlorine pesticide residues contained in cow milk. An essential oil distillator (described in 8th revised edition of Japan Pharmacopoeia) was improved to extract the residue from cow milk and dissolve into solvent. According to the method, preparation of specimen for gas chromatograph analysis with ECD was madesimpler and easier than the standard method. Recovery of pesticides from fortified cow milk was higher in *p,p'*-DDE, lower in β-BHC, using correction factors obtained by this method and compared

to those obtained by the standard method. Advantages of the methods were use of smaller amounts of solvents, non-necessity of using column chromatograph, and less time involved.

75-2304. Gegiou, D. (Res. Dep., State Chem. Labs., Athens, Greece). **Structural analysis of some chlorinated pesticides by nuclear quadrupole resonance spectrometry.** *Talanta* 21(8): 889-892; 1974. (7 references)

The complete nuclear quadrupole resonance (NQR) spectra of aldrin and endrin were determined and two isomers of endosulfan α and endosulfan β were analyzed. The NQR spectrum of aldrin exhibits three resonance signals at room temperature and the expected six signals at lower temperatures. Endrin also exhibits the expected six signals. The assignment by Roll and Biros of both the vinylic chlorine atom resonances at 37.7 MHz and the bridge dichloromethylene chlorine atom resonances at 36.3 and 37.0 MHz is therefore probably incorrect. Based on a spectra structure correlation chart, the resonance signals at 37.86 and 37.19 MHz may be assigned to the two vinylic chlorine atoms, since they give higher frequencies than aliphatic chlorine atoms do. The signals of the chlorine atoms on the dichloromethylene bridge carbon are probably those centered at 36.43 and 36.18 MHz. The remaining resonance frequencies 36.14 and 35.93 MHz are attributed to the bridgehead chlorine atoms. The NQR spectrum of endosulfan α at 77 K exhibits the expected six resonances corresponding to the six chlorine atoms found in the molecule. The number of resonance lines found in endosulfan β at 77 K suggests that there are two molecules per unit cell. The spectra of endosulfan α and β are shown and compared with literature values.

75-2305. Kazanovskiy, E. S. (Izhmo-Pechersk Vet. Sci. Res. Station, Izhmo-Pechersk, USSR). **Opredelenie ostatkov fosfororganicheskikh insektitsidov v organakh i tkanyakh zhivotnykh.** [**Determination of organophosphorus insecticide residues in animal orgns and tissues.**] *Veterinariya (Moscow)* 3: 105-106; 1975. (Russian)

A thin-layer chromatographic method is described for the detection and determination of organophosphate insecticides like fenthion, crufomate, DDVP, trichlorfon, and famophos in organs and tissue samples. Fenthion, crufomate, and DDVP are extracted with chloroform; acetone is used for the extraction of famophos and trichlorfon. The extract is transferred into chloroform for concentration, after which the residues are dissolved in acetone for application on silica gel layer for determination using 2:1 ratio of *n*-hexane and acetone as a solvent system. Trichlorfon, DDVP, fenthion, and crufomate are visualized by a mixture of 1% silver nitrate solution, 15% ammoniacâl solution, and 20% sodium hydroxide solution in a ratio of 2:2:1. For the visualization of famophos, the plate is sprayed with palladium chloride in hydrochloric acid. Identification is possible from the retention values (0.10 for trichlorfon, 0.20 for crufomate, 0.25 for famophos, 0.35 for DDVP, and 0.55 for fenthion). The sensitivity of the detection amounts to 5 μg for famophos. The lower limit of quantitative determination is 0.1 mg/kg for DDVP, fenthion, and famophos and 0.35 mg/kg for trichlorfon and crufomate.

75-2306. Konyukhov, A. F. (All-Union Inst. Exp. Vet., USSR). **Obnaruzhenie fozalona v patologicheskom materials.** [**Detection of phosalone in pathological material.**] *Veterinariya (Moscow)* 4: 93-94; 1975. (Russian)

A simple method for the detection and determination of phosalone in organ and tissue samples is described. Phosalone is extracted with *n*-hexane twice, after which the extract is purified by reextraction with chloroform. Phosalone is determined by thin-layer chromatography, using bromophenol blue solution in acetone and aqueous solution of silver nitrate for visualization. The limit of detectability is 0.3 mg/kg.

75-2307. Todorovic, N. (Military Institute of Technology, Yugoslavia). **Biochemijska metoda detekcije antiholinesteraznih substancija u neobojenim tecnostima.** [**Biochemical method of detecting anticholinesterases in colorless liquids.**] *Vojnosanit. Pregl.* 31(4): 242-244; 1974. (8 references) (Serbo-Croatian)

A fast, sensitive biochemical method has been developed for the detection of certain anticholinesterases, including organophosphate pesticides, in drinking water and other colorless liquids. The simplicity of this method permits its use under lab and field conditions. The test reagents are prepared in advance, in the form of highly stable solutions: 1) a buffered, stabilized solution of butyrocholine esterase as the test enzyme; 2) Ellman's reagent, or 5-5-dithiobis-2-nitrobenzoic acid, which produces a butyrylthiocholine iodide reaction. The enzyme may be used for two years after preparation, the substrate and Ellman's reagent for 3 years. Sensitivity of the method varies between 0.001 and 0.0001 mg/l, depending on the type of anticholinesterase to be detected.

75-2308. Skvortsova, A. E.; Myasoedova, A. S.; Rubtsova, E. S. (Shchelkovo Branch, All-Union Sci. Res. Inst. Chemical Means of Plant Protection, Shchelkovo, USSR). **Fotometricheskoe opredelenie malykh kolichestv monometilamina, mono- i dimetilmocheviny s 2,4-dinitrokhlorobenzolom.** [**Photometric determination of small amounts of mono-methylamine and mono- and dimethylurea with 2,4-dinitrochlorobenzene.**] *Zavod. Lab.* 40(2): 152-153; 1974. (2 references) (Russian)

Trace quantities of monomethylamine, and mono- and dimethylurea, which are present in naphthylcarbamate insecticides and in waste gases and wastewater in naphthylcarbamte production, were determined photometrically. The sample to be analyzed for monomethylamine is dissolved in a mixture of water and ethanol, after which it is combined with 2,4-

dinitrochlorobenzene which forms a yellow product with the amine in a reaction conducted at 65°C for 2.5 hr. The photometric determination is done at an absorption maximum of 405 n. Beer's law is obeyed in a concentration range of 10-10 mg/liter. For their photometric determination monomethylurea and dimethylurea are hydrolyzed to monomethylamine with sulfuric acid.

75-2309. Skvortsova, A. E.; Myasoedova, A. S.; Rubtsova, E. S. (Shchelkovo Branch, All-Union Sci. Res. Inst. Chemical Means of Plant Protection, Shchelkovo, USSR). **Opredelenie lebaytsida v tekhnicheskom produkte preparativnoy forme. [Photometric determination of lebaycid.]** *Zavod. Lab.* 40(3): 264-265; 1974. (4 references) (Russian)

A photometric method is described for the determination of technical-grade fenthion (lebaycid) and its formulations. The pesticide is dissolved in diethyleneglycol for subsequent acid hydrolysis with hydrochloric acid, after which the resulting 4-methyl-thiocresol is reacted with diazobenzosulfonic acid in an azotization reaction. The metabolites of fenthion do not engage in azotization reactions. The 4-methyl-*m*-thiocresol as an impurity present in fenthion is determined by the same procedure without hydrolysis. The method is suitable for the determination of fenthion in a concentration range of 0.0005-0.003 g/liter, the error being 0.5% for technical-grade fenthion, and 2% for fenthion formulations.

75-2310. Kosmatyy, E. S.; Chebot'ko, K. A.; Galinskaya, V. I.; Strelko, V. V. (Ukrainian Sci. Res. Inst. Plant Protection, Kiev, USSR). **Opredelenie dikvata i parakvata v smesi metodom tonkosloynoy khromatografii s primeneniem spetsificheskogo silikagelya. [Determination of diquat and paraquat in their mixtures by thin-layer chromatography using a specific silical gel.]** *Zh. Anal. Khim.* 29(1): 168-179; 1974. (15 references) (Russian)

A specific silica gel for the separation of paraquat and diquat in their mixtures and a thin-layer chromatographic method for their determination are described. Mixtures of paraquat and diquat are separated on a specific silica gel with increased adsorption ability and selectivity with regard to paraquat. The silica gel was prepared in the presence of paraquat to make it specific for this substance, using the method described by Dickey. A 1:0.5:1 mixture of *n*-butanol, water, and ethanol was used as solvent system for the thin-layer chromatographic determination of diquat and paraquat. The pesticides were visualized on the chromatograms by spraying them with 1% solution of silver nitrate in 0.5N-solution of ammonia water and 0.1% fluorescein solution in ethanol. Paraquat and diquat, with the respective Rf values of 0.6 and 0.71, are separated on the silica gel layer.

See also **75-2105** **75-2117** **75-2119** **75-2164** **75-2251**

PESTICIDES ABSTRACTS

QUARTERLY INDEX

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PREFACE

The basic design for this index was supplied by the Technical Services Division, Office of Pesticide Programs, Environmental Protection Agency. It consists of two subject indexes (concept and compound) and two author indexes (personal and corporate). Primary and secondary headings in the Concept Index appear as subordinate headings in the Compound Index, both indexes having three levels of specificity.

In the Concept Index, only general aspects are indexed under the broader terms shown below. For specific terms, the reader should consult the appropriate heading in the Concept Index, selecting the narrower term that best fits his need.

Compounds are indexed by their common names; where other compound designations are used by authors, these synonyms appear with the notation to *see* the common name. Articles referring, in general, to structural or functional chemical classes are indexed under the broader headings (e.g., organochlorines, herbicides, etc.).

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